U. S. Government

RESEARCH REPORTS

February 20, 1962
Vol. 37, No. 4

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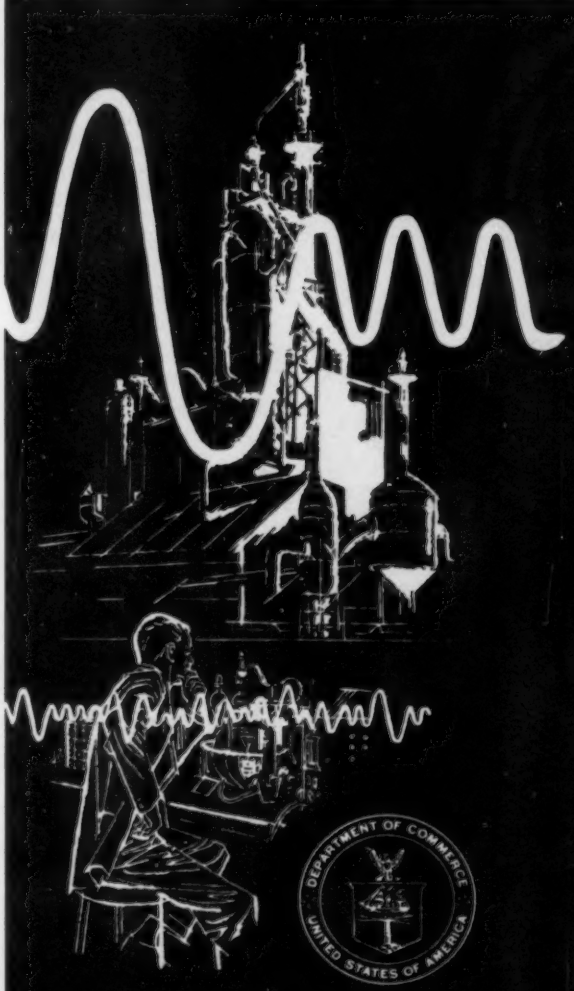

U. S. DEPARTMENT OF COMMERCE
BUSINESS AND DEFENSE SERVICES ADMINISTRATION
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U.S. GOVERNMENT RESEARCH REPORTS

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, *Secretary*

BUSINESS AND DEFENSE SERVICES ADMINISTRATION

Office of Technical Services
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Use of funds for printing this publication approved by the Director of the Bureau of the Budget, June 30, 1961.

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Washington 25, D. C.

TECHNICAL ABSTRACT BULLETIN

1. AIRCRAFT AND FLIGHT EQUIPMENT

AD-267 151 Div. 1
(TISTA/SEB) OTS price $.75

General Tire and Rubber Co., Wabash, Ind.
DEVELOPMENT OF ORAL-NASAL MASKS, OXYGEN, MC-1 AND MBU-5/P.
Rept. on Oxygen Dispensing Assemblies,
by Henry W. Seeler. Aug 61, 16p. incl. illus.
(Contracts AF 33(600)26382; AF 01(601)20275; AF 33(600)38997; and AF 33(600)29804, Proj. 6352; In cooperation with Sierra Engineering Co., Sierra Madre, Calif.)
(ASD TR 61-395) Unclassified report

DESCRIPTORS: (*Oxygen masks, Breathing masks, Design, Tests.)

A small, lightweight, nonfreezing, oral-nasal pressure-breathing oxygen mask for use at altitudes to 45,000 ft was developed. The program covered two masks, the single-size MC-1 mask and the four-size MBU-5/P mask. The one-size mask would not accommodate a large enough segment of the Air Force flying population. Pilots enthusiastically indorsed the MBU-5/P mask. Each mask has a single, pressure-compensated, inhalation-exhalation valve as well as provisions for a small, lightweight, noise-suppressing microphone. A single-strap, self-oriented harness requiring only one buckle for adjustment was developed. An altitude-compensating, harness tension system and a quick-donning mask harness are described. (Author)

AD-267 174 Div. 1
(TISTA/WAW) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
EMPIRICALLY DETERMINED EFFECTS OF GROSS TERRAIN FEATURES UPON GROUND VISIBILITY FROM LOW-FLYING AIRCRAFT,
by Ronald A. Erickson. 13 Sep 61, 30p. incl. illus. tables (Rept. no. NOTS TP 2760)
(NAVWEPS rept. no. 7779)
Unclassified report

DESCRIPTORS: (*Surface targets, Visibility, Terrain, Detection from Aircraft, Airplanes, Probability.)

A study is described in which the degree of target obstruction by various types of terrain as seen from various altitudes is empirically determined. Curves are presented showing the percentage of terrain that is in view to an observer at various altitudes and showing the probability, as a function of ground range, that a point on the terrain is in view. These results can be used in the computation of the over-all visual detection probability of ground targets from aircraft. (Author)

AD-267 292 Div. 1, 22
(TISTW/JRG) OTS price $2.60

Ogden Air Material Area, Hill Air Force Base, Utah.
HAZARD CLASSIFICATION TEST ON ROCKET CATAPULT MK 2.
Airmunitions test rept.,
by Angelo Pappas. Nov 61, 19p. incl. illus.
(OOY TR 61-44)
Unclassified report

DESCRIPTORS: (Hazards, Tests, *Explosive actuators, *Catapults for Jet fighters, *Ejection seats.) (Hazards, Fires, Detonation, Shipping, Storage, Tests, *Rocket motors of *Explosive actuators and *Rocket propellants and Catapults in Ejection seats.)

Tests were conducted to establish the hazard classification of the completely assembled rocket catapult Mk 2 used in the F-106A and F-106B aircraft. One rocket motor of a catapult in a shipping container was primed and detonated to determine if propagation would occur between the 2 rocket motors within the container. Tests to determine propagation from one container to another were not performed because no propagation occurred within the single container. The cook-off tests to determine the effect of fire on the firing mechanism, igniters, and rocket motors resulted in ignition of one or both of the twin rocket motors of the catapult. As a result of these tests, it is recommended that the explosive hazard classification of Quantity Distance Class 2, Storage Compatibility Group F and ICC Class B be assigned to the rocket catapult Mk 2. (Author)

AD-267 321 Div. 1, 2, 14
(TISTM/EJH) OTS price $7.60

Kaysam Corp. of America, Paterson, N. J.
STUDY OF PHYSICAL AND CHEMICAL CHARACTERISTICS OF BALLOONS AND BALLOON MATERIALS.
Quarterly progress rept. no. 6, 25 July-24 Oct 61,
by Eric Nelson and Herman Newstein, ed. by John Kantor. 24 Oct 61, 71p. incl. illus. tables.
(Rept. no. 6)
(Contract DA 36-039-sc-84925, Proj. 3D36-21-001-04)
Unclassified report

DESCRIPTORS: (Meteorological balloons, *Balloons, Materials, *Buoyant materials, Films, Configuration, Aerodynamic configurations, Radiation effects, Radiation damage.) (*Elastomers, Synthetic rubber, Plasticizers, Reinforcing materials, Carbon black, Additives, Vaporization.) (Processing, Stresses, Deformation, Mechanical properties, Manufacturing methods, Chemical properties, Physical properties.) (Atmosphere, Infrared radiation, Ultraviolet radiation, Ozone.) (High altitude, Meteorology, Flight testing, Test methods.)

Contents:
STUDY OF BALLOON FILMS AND THEIR EFFECT ON

BALLOON FLIGHT PERFORMANCE: Raw materials; neoprene polymers, accelerators, reinforcing fillers. Development of formulations with desirable film properties; dual-purpose balloon compounds, fast-rise balloon compounds. Correlation of film properties with flight data; dual-purpose balloons. EFFECTS OF FLIGHT CONDITIONS ON BALLOON FILM PERFORMANCE: IR, UV and other short-wave radiation; Prediction of balloon performance; determination of physical properties of constant-level balloon films; stress in sounding balloons. STUDY OF BALLOON CONFIGURATION: Balloons with mechanical attachments to improve rate of ascent.

AD-267 336 Div. 1
(TISTA/VGW) OTS price $5.60

National Aviation Facilities Experimental Center, Atlantic City, N. J.
EVALUATION OF STR. 30-B1 RADIO ALTIMETER. Final rept.,
by S. A. Segen. Mar 61, 6p. incl. illus. tables.
Unclassified report

DESCRIPTORS: (*Radio altimeters, Altimeters, Flight testing, Tests, Effectiveness, Sensitivity, Reliability, Signal-to-noise ratio, Maintenance, Operation, Design.)

Laboratory and flight tests were conducted to determine altimeter performance. The laboratory tests included measurements of power consumption, transmitter power output, receiver sensitivity, system noise, sensitivity to line voltage variations and interferences, altimeter time constant, and static range errors. The flight tests included effects of aircraft noise, effects of moving the various aircraft appendages, determination of maximum usable altitude ranges, and in-flight accuracy. The accuracy tests included level flights at various altitudes and over various terrains, and performance during landing. Subjective data on pilot use of the equipment were obtained. Adequacy of test equipment and procedures and maintenance requirements were determined. (Author)

AD-267 343 Div. 1
(TISTA/SEB) OTS price $9.60

Vertol Div., Boeing Airplane Co., Morton, Pa.
WIND TUNNEL TESTS AND FURTHER ANALYSIS OF THE FLOATING WING FUEL TANKS FOR HELICOPTER RANGE EXTENSION. VOLUME 4. COUPLED WING-FUSELAGE FORCED VIBRATION ANALYSIS 45 DEGREES SKEWED HINGE,
by R. Ricks and R. Gabel. Aug 61, 109p. incl. illus. (Rept. no. R-252)
(Contract DA 44-177-tc-550, Proj. 9X38-09-006)
(TCREC TR 61-105) Unclassified report

DESCRIPTORS: (*Floating wings as *Fuel tanks for *Helicopters, Aerodynamics.) (Helicopter engines, Helicopter blades, Rotor blades, Vibration, Deflection, Air speed, Measurement.) (Tests, Wind tunnels, Mathematical analysis, Statistical analysis.)

Forced response calculations are performed on the H-21 helicopter equipped with floating fuel wings for the 0 and 100% fuel configurations. Using third harmonic shaft loads measured on an H-21 helicopter, and a deflection test obtained analytical model of the H-21 fuselage, the Associated Matrix method is employed to calculate the fuselage forced response. Results are presented as modal time histories of the fuselage for third harmonic azimuth positions of 0, 45, 90, and 135 degrees, and the resultant vertical and lateral responses at the cockpit floor during an rpm sweep. At 0% fuel, vertical response compares closely to that of the standard helicopter. Laterally, response increases with rotor speed, having an acceptable level at the lower range and higher amplitude at 268 rpm. For 100% fuel, the forced response calculations indicate a lateral natural frequency close to, but below, the 3 omega excitation at 250 rpm. In both the lateral and vertical directions, the calculated undamped vibration levels are high at lower speeds, but appear satisfactory at 268 rpm. Past experience indicates that predicted vibration levels near resonance are reduced by damping. (Author)

AD-267 350 Div. 1
(TISTA/SEB) OTS price $13.50

Vertol Div., Boeing Airplane Co., Morton, Pa.
WIND TUNNEL TESTS AND FURTHER ANALYSIS OF THE FLOATING WING FUEL TANKS FOR HELICOPTER RANGE EXTENSION. VOLUME 5. ANALYSIS OF STABILITY. CONTROL AND PERFORMANCE CHARACTERISTICS.
by H. Neeb, D. Lawrence, and R. Johnstone. Aug 61, 186p. incl. illus. tables (Rept. no. R-255)
(Contract DA 44-177-tc-550, Proj. 9X38-09-006)
(TCREC TR 61-106) Unclassified report

DESCRIPTORS: (*Floating wings, *Fuel tanks, Aerodynamics, *Helicopters, Stability, Stability (Lateral) Stability (Longitudinal). Control, Flight testing, Simulation, Theory, Mathematical analysis, Statistical analysis, Equations of Motion.) (Wind tunnel, Tests.)

An analytical investigation of the stability and performance of a Boeing-Vertol H-21 tandem rotor helicopter equipped with floating wing fuel cells as a means of ferry range extension is described. The stability of the total system was studied with the wing located forward and directly under the helicopter center-of-gravity (cg). Two methods of stabilizing the wing oscillations about the hinge were studied: (a) A skewed hinge line, introducing a change in angle of attack as a function of the flapping disturbance; and (b) a geared trailing edge flap, mechanically linked to deflect when the wing flaps. Satisfactory stability was obtained with the wing positioned directly beneath the helicopter cg, using an unskewed hinge line, and geared flaps. The forward wing location was unsatisfactory from the standpoint of longitudinal stability for the light wing case. Flight simulator studies emphasize the need for additional lateral control to supplement that produced by the basic aircraft. (Author)

AD-267 357 Div. 1
(TISTA/WAW) OTS price $2.60

Bell Helicopter Corp., Fort Worth, Tex.
ARMY-NAVY INSTRUMENTATION PROGRAM. REDUNDANCY IN THE DISPLAY OF SPATIAL ORIENTATION. Technical data,
by Claude B. Elam, Jack Emery, and W. G. Matheny. Aug 61, 18p. incl. illus. tables (Rept. no. D228-421-009)
(Contract Nonr-167000)
Unclassified report

DESCRIPTORS: (Helicopters, All weather aviation, *Flight instruments, Human

engineering.) (Flight position indicators, *Flight attitude indicators, Display systems, Simulation, Flight simulators, Analog systems, Tests.)

Studies were made of problems involved in extracting, presenting, and displaying analog flight attitude information to helicopter pilots. Results do not support the view that stimulus redundancy contributes significantly toperformance. Stimulus redundancy may be considered to have two aspects. The first is that of a mere combination of elements, and the second is a combination which gives rise to a new precept such as depth. The apparatus used possessed two degrees of freedom only (pitch and roll), while vertical, lateral, and longitudinal displacement and yaw were static. Secondly, the use of non-pilots may have prevented a difference between displays from emerging, since pilots are accustomed to making stick responses in the presence of a moving horizon while non-pilots are not. However, the present experimental design is justified since, if a difference had been found between displays the results would have been applicable to considerations for the design of altitude indicators. The differences, if existent, are not to be measured by the method selected. Although these results are not in agreement with those of Matheny and Hardt (ANIP Rept. no. D228-421-002), a difference could conceivably be obtained between the two methods.

AD-267 383 Div. 1
(TISTA/VGW) OTS price $1.10

Naval Air Test Center, Patuxent River, Md.
A4D ESCAPE SYSTEM, EVALUATION OF MODIFIED HEADREST INSTALLED BY A4D AIRCRAFT SERVICE CHANGE NO. 157C FOR ACCEPTABLE HEAD POSITIONING.
Rept. no. 1 (Final),
by G. A. Bacas. 5 Aug 60, 3p. illus. table.
(Serial no. ST311-276)
(Proj. TED no. PTR RAAE-23004)
Unclassified report

DESCRIPTORS: (Attack bombers, Naval aircraft, Jet bombers, *Ejection seats, Aircraft seats, Pilot seats, Design, Configuration, Flight testing.)

The Service Test Division conducted an evaluation of a modified headrest configuration (A4D ASC 157C) for the RAPEC low level ejection system to determine if the headrest configuration afforded acceptable pilot head positioning during catapult launches. The modified headrest configuration was considered satisfactory for service use; however, incorporation of firmer headrest material is considered desirable for improved service use. (Author)

AD-267 523 Div. 1
(TISTA/VGW) OTS price $7.60

Wichita U. School of Engineering, Kans.
A SUMMARY ANALYSIS OF AN STOL TRANSPORT,
by Kenneth Razak and A. J. Craig. Aug 61, 78p. incl. illus. (Engineering rept. no. 365)
(Contract DA 44-177-tc-356)
(TCREC TR 61-107) Unclassified report

DESCRIPTORS: (*Transport planes, *Short take-off planes, Aerodynamics, Design, Aerodynamic configurations, Analysis, Specifications, Military requirements.) (Wind tunnel models, Model tests of Wings for Short take-off planes, Jets, Flaps, Deflection, Downwash, Lift, Drag, Moments, Analysis, Theory, Topology, Mathematical analysis, *Theses.)

This rept. includes:
THE TOPOLOGY OF THE AERODYNAMIC PARAMETERS OF AN AIRPLANE WITH A JET-AUGMENTED FLAP, by William H. Wentz, Jr. Thesis. June 61, 58p. incl. illus.

A preliminary analysis has been made of an STOL transport of 35,000 pounds gross weight equipped with features that produce a total performance not heretofore achieved in a single airplane. The prime goal of the analysis was to secure an airplane in which a pilot could consistently achieve landings such that the landing field length is the same as the best performance of the airplane. The landing distance of this airplane is 1170 feet and the take-off distance is 1380 feet, both over a 50-foot obstacle at ICAO standard sea level conditions. A method of analysis is described which involves the use of trailing edge flaps deflected to 100 degree and the use of thrust to flare the airplane. The control of the airplane L/D ratio makes it possible to achieve consistently the above landing distances. (Author)

AD-267 562 Div. 1
(TISTA/VGW) OTS price $19.75

Vertol Div., Boeing Co., Morton, Pa.
STUDY TO ESTABLISH REALISTIC ACOUSTICAL DESIGN CRITERIA FOR FUTURE ARMY AIRCRAFT,
by H. Sternfeld, Jr., R. H. Spencer, and E. G. Schaeffer. June 61, 325p. incl. illus. tables, 28 refs. (Rept. no. 192)
(Contract DA 44-177-tc-562, Proj. 9R38-01-017-54)
(TREC TR 61-72) Unclassified report

DESCRIPTORS: (*Airplane noise, Reduction by Acoustic insulation, Insulating materials.) (Airplane noise, Pressure, Measurement, Specifications, Military requirements, Tables.) (Aviation personnel, Maintenance personnel, Physiology, Fatigue (Physiology), Stress (Physiology), Effectiveness, Human engineering.) (Vertical take-off planes, Short take-off planes, Helicopters, Liaison planes, Operation, Noise, Acoustics, Design.)

A study is reported of aircraft noise and its effect on Army operation and utilization of equipment. A sound pressure level measurement program was carried out on 12 Army aircraft (specifically, the L-20, L-23, U-1A, H-13, H-21, H-23, H-34, H-37, HU-1A, YHC-1A, Doak 16 and Vertol 76 Aircraft). A study was also made of the effect of aircraft noise on Army aircraft operations as limited by the noise environment to which pilots are exposed, and performance limits which might be imposed on the aircraft by additional soundproofing treatments. It was concluded that MIL-A-8806 (ASG), the Military Specification for noise levels in aircraft should be amended for Army Aircraft during normal cruise power by the addition of tabular data on frequency bands and acceptable noise level at normal cruise power. (Author)

AD-267 575 Div. 1
(TISTA/VGW) OTS price $4.60

Vertol Div., Boeing Co., Morton, Pa.
NOISE SURVEY HU-1A HELICOPTER WITH MODIFIED

EXHAUST SYSTEM.
by R. H. Spencer and H. Sternfeld, Jr. July 61, 38p. incl. illus. (Rept. no. 247)
(Contract DA 44-177-tc-562, Proj. 9R38-01-017-54)
(TCREC TR 61-92) Unclassified report

DESCRIPTORS: (*Helicopters, *Airplane noise, Airplane engine noise, Exhaust diffusers, Acoustics, Noise, Pressure, Operation, Flight testing, Measurement, Tests, Tables.) (Exhaust systems, Design.)

Noise levels of Army HU-1A helicopters 9-1632 (equipped with a modified exhaust system) and 58-2080 (standard configuration) were recorded under similar operating and ambient conditions. Some difference exists in the 200 ft directivity patterns of the aircraft in hover, along with an increase in high frequency noise in take-off and landing. The latter may be due to pilot techniques in achieving the requirements of Test 2. Except for these, however, sound pressure levels of the aircraft, under similar operating conditions, are considered the same. Other differences lie within the envelope of repeatability. It is concluded that the modified exhaust system of HU-1A No. 9-1632 does not significantly affect the acoustic characteristics of the aircraft. (Author)

AD-267 624 Div. 1, 12
(TISTE/CCD) OTS price $11.00

Lockheed Aircraft Corp., Sunnyvale, Calif.
STRUCTURAL SHELL OPTIMIZATION STUDIES. VOLUME 2. OPTIMIZATION OF STIFFENED CYLINDRICAL SHELLS SUBJECTED TO UNIFORM EXTERNAL HYDROSTATIC PRESSURE.
Final technical rept.,
by E. H. Nickell and R. F. Crawford. 30 June 61, 143p. incl. illus. tables, 34 refs. (Rept. no. 3-42-61-2)
(Contract NOrd-18780)
Unclassified report

DESCRIPTORS: (*Structural shells, Cylindrical bodies, *Stiffened cylinders, Hydrostatic pressure, Load distribution, Pressure, Stresses, Mathematical analysis, Structures.)

An optimization analysis is presented for ring-stiffened cylindrical shells subjected to an external uniform hydrostatic pressure with test results on ring-stiffened cylinders. Also included are design charts for optimum geometry to give minimum weight designs for stiffened cylindrical shells as well as bearing allowables for beryllium sheet and beryllium sheet metal fabrication notes. (Author)

AD-267 626 Div. 1, 12
(TISTE/CRJ) OTS price $5.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
MINIMUM WEIGHT ANALYSES FOR FOUR TYPES OF STIFFENED, FLAT, COMPRESSION PANELS AND THEIR RELATIVE EFFICIENCY.
Technical rept. on. Flight Sciences,
by A. B. Burns and R. F. Crawford. June 61, 50p. incl. illus. 12 refs. (Rept. no. 2-47-61-1)
(Contract AF 33(616)6905)
Unclassified report

DESCRIPTORS: (*Guided missiles, *Satellite vehicles, *Aerodynamic configurations, Structures, Mathematical analysis.) (*Structures, Sandwich panels, Sheets, Load distribution, Stresses, Pressure.)

Minimum weight analyses for 4 types of flat compression panel construction, each of which is stiffened parallel to the direction of loading, are described and solutions presented and compared. These solutions indicate the most efficient distribution of material between skin and stiffeners for each construction as a function of the magnitude of the load. Similar analyses, solutions and comparisons applicable to wide columns are appended. Design charts for both the flat compression panel construction and wide column construction are given, comparing less efficient geometries to the minimum weight geometries. (Author)

AD-267 642 Div. 1
(TISTA/SEB) OTS price $1.60

Naval Air Test Center, Patuxent River, Md.
SIGHT UNIT SHIFT IN F8U-1 AIRCRAFT; INVESTIGATION OF.
Rept. no. 1, (Final),
by J. F. Bolger, Jr. and R. B. Davis. 24 Feb 60, 13p. incl. illus. (Serial no. AT33-4)
(Proj. Ted no. PTR-AV-32017)
Unclassified report

DESCRIPTORS: (Naval aircraft, Jet fighters, *Mounting brackets for Bore sighting, Effectiveness, Flight testing, Tests.)

The sight unit, Mark 11 Mod 2, and associated mounting brackets were tested in an F8U-1 aircraft to determine their ability to hold boresight position under service conditions. It was found that the only appreciable sight shift occurred in the elevation plane. The major component of this shift was caused by boresight adjustment slippage within the boresight adjusting assembly. It was recommended that the boresight adjusting assembly be modified to incorporate the use of a gun sight locking device. (Author)

AD-267 724 Div. 1, 19, 7, 25
(TISTW/RD) OTS price $5.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF INSTITUTES OF HIGHER LEARNING INSTRUMENT MANUFACTURE (SELECTED ARTICLES).
13 Nov 61, 48p. incl. illus. table (Trans. no. FTD-TT-61-42 of Izvestiya Vysshykh Uchebnykh Zavedeniy, Priborostroyeniye 3:pp. 3-9, 44-62, 106-109, 1960)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Optical systems, Spheres, Surfaces, Refraction, Optical images.) (*Motor starters, *Transformers, Alternating current.) (Gyro stabilizers, Inertial navigation, *Gyroscopes of Motion, Drift.) (*Compasses, Gyroscopes, Automatic, Flight instruments.)

Contents:
The balancing process in ac polar-coordinate compensators
The effect of gyroscope drift on the motion of a gyro-stabilized platform with T equal to 84.4 min.
An automatic precision device for determining true course and latitude
The invariant for a meridional coma of a spherical surface of refraction

AD-267 733 Div. 1
(TISTA/WAW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN AERONAUTICAL SIGHT FOR HOMING AN AIRCRAFT FROM AN ARBITRARY COURSE TO A GIVEN POINT ALONG THE COURSE,
by L. A. Grinev. 21 Nov 61, 3p. incl. illus. (Trans. no. MCL-1310 of Byulleten' Izobreteniy, Patent no. 129837, 13:56-58, 1960)
Unclassified report

DESCRIPTORS: (Sights, *Optical sights, Design, Technological intelligence, Translations.) Automatic pilots, Homing devices, USSR.

The aeronautical sight described is for homing an airplane from an arbitrary course to a given point along the set flight-path. It is equipped with a revolving mirror for continuous sighting of the given point on the terrain. It is coupled with a resistorized computer which controls the autopilot such that the plane swings in a circular arc which is tangent to the given flight path at the required point. (Author)

AD-268 053 Div. 1
(TISTM/REB) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF TEMPERATURE STRESSES ON THE STABILITY OF A SANDWICH WING PANEL,
by V. P. Karnozhitskiy. 1 Dec 61, 11p. incl. illus. (Trans. no. FTD-TT-61-239 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Seriya Aviatsionnaya Tekhnika No. 3:69-77, 1961)
Unclassified report

DESCRIPTORS: (*Wings, Aerodynamic heating, *Sandwich panels, Stresses, Stability, Theory, *Thermal stresses.) (USSR, Translations, Technological intelligence.)

A study was made of the stability of a sandwich wing panel compressed in one direction in the presence of different temperatures on the upper and lower carrying layers. It is considered that the hypothesis of straight-line normals is valid for the carrying layers. The general relations of the theory of elasticity are used for the core materials; however, it is assumed that the entire compression load is received by the carrying layers and that the core material up to the moment of bulging is free of stresses. The temperature stresses and strains in the core material are not taken into account in view of the small rigidity of the latter. (Author)

AD-268 056 Div. 1
(TISTA/SEB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A BOAT IN THE STRATOSPHERE,
by V. Ponedel'nik. 1 Dec 61, 1p. (Trans. no. FTD-TT-61-258 of Izvestiya, 17 Sep 61)
Unclassified report

DESCRIPTORS: (*Flying boats, Jet planes, Records on Flight speeds, Flight paths.) (*Translations, Technological intelligence, USSR.) Flight testing.

Eleven world records were set with the M-10 domestic seaplane, with jet engines. The plane carried various amounts of weight to new altitudes and speeds. (Author)

AD-268 072 Div. 1
(TISTA/SEB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AT SUPERSONIC VELOCITY.
27 Nov 61, 3p. (Trans. no. FTD-TT-61-203 of Sovetskaya Litva, pp. 3, 28 July 61)
Unclassified report

DESCRIPTORS: (Aviation safety, *Ejection seats, *Jettisonable cockpits, Design.) (Translations, Technological intelligence, USSR.)

New types of ejection seats were developed in recent years. Instead of pyrotechnic cartridges, they use rocket engines. The most perfect samples allow ejections at velocities up to 24000 km/hr. Developed also were the first samples of special safety capsules. They are like small cabins formed by extensive walls. Such a capsule closes automatically and becomes hermetically sealed prior to catapulting, offering protection against counter stream of air, and safe landing. In addition, it serves as a container for rescue devices (parachutes, emergency supply, oxygen equipment etc.) and as a rescue raft in case of falling into the water. (Author)

2. ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-267 155 Div. 2, 15
(TISTP/MFA) OTS price $3.60

Naval Weapons Lab., Dahlgren, Va.
A NONSINGULAR SET OF ORBIT ELEMENTS,
by C. J. Cohen and E. C. Hubbard. 5 July 61, 28p. incl. illus. (NWL Rept. no. 1756)
Unclassified report

DESCRIPTORS: (*Celestial mechanics, Orbital flight paths, *Perturbation theory.) (*Mathematical analysis, Equations of Motion, Transformations (Mathematics), Differential equations, Partial differential equations, Integration.)

Orbit elements are defined which are free of singularities for all elliptic orbits and, in particular, for circular and for equatorial orbits. Formulae are presented which: relate the nonsingular elements to the classical elements and to coordinates; express differentials of the coordinates and velocity components in terms of differentials of the nonsingular elements; and give the equations of motion in nonsingular elements (variation of parameters). The formulae were verified numerically in extensive tests on the Naval Ordnance Research Calculator. (Author)

AD-267 191 Div. 2
(TISTP/MFA) OTS price $5.60

Minnesota U. School of Physics, Minneapolis.
ATMOSPHERIC PHENOMENA. ENERGETIC ELECTRONS. AND THE GEOMAGNETIC FIELD.
by J. R. Winckler. July 61, 46p. incl. illus. (Technical rept. no. CR-40)
Unclassified report

A portion of this material was presented at the URSI Symposium on Physical Processes in the Earth's Plasma Environment, May 1, 1961, at Washington, D. C.

DESCRIPTORS: (*Terrestrial magnetism, Magnetic fields, *Electrons, Atmospherics, Bremsstrahlung from Balloons and Rockets, Measurement, X rays, Van Allen radiation belt, Aurorae, Astronomical observatories, Solar disturbances, *Ionosphere.) (Instrumentation, Scintillation counters, Electron beams.) (Astronomical data, Tables.)

X-ray measurements associated with the dumping of electrons from the magnetic field, made with balloons and rockets are discussed. It is shown that in the normal auroral zone the x-ray bursts occur throughout the 24-hour period, have peak intensities corresponding to electron fluxes of 10 to the 6th to 10 to the 7th power/sq cm/sec, and have integrated fluxes over a 24-hour period of 10 to the 10th power/sq cm. In the auroral zone the x-ray bursts arising from 30-kv or higher electrons are not correlated with visible aurorae. Direct rocket measurements of bright aurorae in the auroral zone confirm this by showing the absence of appreciable electron fluxes above 20 kv. At lower latitudes, the x-rays are well-correlated with visible aurorae, have peak burst intensities of 10 to the 9th power electrons/sq cm/sec greater than 30 kv, and are also strongly correlated with negative bays in the local magnetic field. (Author)

AD-267 245 Div. 2
(TISTP/MFA) OTS price $1.60

Pennsylvania State U. Mineral Industries Experiment Station. University Park.
MODEL STUDIES OF SEISMIC ENERGY DISTRIBUTION AROUND DIFFERENT TYPES OF SOURCE.
Progress rept. no. 4,
by B. F. Howell, Jr., P. M. Lavin, and J. H. Pfluke. 30 Nov 61, 19p. incl. illus. table.
(Contract AF 19(604)7383)
(ARPA Order no. 180-61)
Unclassified report

DESCRIPTORS: (*Geophysics, *Seismic waves, *Earth models, Simulation, Sources.) (Stresses, Deformation, Shear stresses.) (Energy, Wave transmission, Velocity.) (Experimental data, Tables.)

Several seismic patterns from earth model studies in the presence of velocity discontinuities near the source are examined. Five typical conditions have been studied: a boundary passing thru the focus; one to one side of the focus; two boundaries symmetrically on either side of the focus; a similar arrangement with the two boundaries assymetrical; and a circular area of higher velocity to one side of the fault. A complete set of records for both P and S waves has been obtained for the six different models for each of the four source systems under study. This is by no means all the cases which could be studied profitably, but it does serve to illustrate the type of result to be expected. (Author)

AD-267 308 Div. 2
(TISTP/MFA) OTS price $6.60

Woods Hole Oceanographic Institution, Mass.
CRAWFORD CRUISE 18. A STUDY OF GULF STREAM MEANDERS.
Technical rept.,
by Ferris Webster. Sep 61, 23p. illus. tables.
(Reference no. 61-18)
(Contract Nonr-219600, Proj. NR-083-004)
Unclassified report

DESCRIPTORS: (*Gulf stream, *Ocean currents, Oceanography, Oceanographic vessels.) (*Oceanographical data, Analysis, Oceanographic charts, Energy, Temperature, Salinity, Velocity.) (Tables, *Bibliography.) Instrumentation.

CRAWFORD Cruise 18 was undertaken in May and June 1958, with the purpose of studying the structure of Gulf Stream meanders off Onslow Bay, North Carolina. This was done by successive crossings of the axis of the current by the research vessel CRAWFORD. During the cruise, 120 crossings were completed. The data collected on that cruise are presented. Included are some results of an analysis of the data. (Author)

AD-267 339 Div. 2
(TISTP/MFA) OTS price $1.60

Air Weather Service, Scott Air Force Base, Ill.
ESTIMATES OF ALTITUDES WITH SPECIFIED PROBABILITIES OF BEING ABOVE ALL CLOUDS,
by Irving Solomon. Oct 61, 18p. incl. illus.
(Technical rept. no. 159)
Unclassified report

DESCRIPTORS: (*Height finding, Probability, *Clouds, Meteorological data, Meteorological charts.) Northern hemisphere.

The results of developmental efforts by the Climatic Center, USAF, toward a graphical method for estimating the probabilities of being above all clouds is presented. Such information is useful to various Air Force and other governmental planning agencies and is not available in other known sources. The quantitative results provided are designed as a basic planning tool for long-range purposes. (Author)

AD-267 353 Div. 2
(TISTP/MFA) OTS price $3.60

Uppsala U. (Sweden).
RESEARCHES OF WHISTLERS.
Technical scientific rept. no. 1 on Lightning Discharges in Relation to Whistlers,
by Harald Norinder. Feb 59, 39p. incl. illus. tables, 24 refs.
(Contract AF 61(052)07)
(AFCRC TN 59-281) Unclassified report

DESCRIPTORS: (*Atmospherics, Lightning, *Electric discharges, Storms, *Ionosphere.) (Meteorological data, Sweden.) (Oscillograms, Amplifiers, Transformers.) (Electromagnetic waves, Magnetic fields, Electric fields.)

A station for analysis of relations between lightning discharges and whistlers was operated near Uppsala. After preliminary tests in 1956-57 a definite program was realized during the thunderstorm season of 1958. It was found that whistlers occur in groups - whistler situations - with periods often of 1/2-2 1/2 hours, exceptionally of 5-6 hours. Whistlers sometimes occurred in great numbers for shorter periods of time between total cessations. These extended

over hours, days and even weeks. Whistler situations on days with thunderstorms were located by a CRO direction finder. It was found that while a thunderstorm in one direction produced whistlers, a simultaneous thunderstorm in another direction at about the same distance sometimes did not. Variations in the same thunderstorm of the electric field force from atmospherics related or not to whistlers resulted in that atmospherics with the highest field force were always followed by whistlers. This was explained partially by facilitated propagation for wave-packets in the low-frequency band around 5 kc and partially by high initial energy in the discharges causing whistlers. A comparison in the same thunderstorm of waveforms from atmospherics not producing whistlers showed typically irregular variational forms and one single discharge in the lightning path. (Author)

AD-267 392 Div. 2
(TISTP/MFA) OTS price $7.60

Max-Planck-Institut fuer Chemie, (Germany).
STUDIES ON METEORITES.
Final rept.,
by H. Wanke and H. Konig. 1960, 76p. incl. illus. tables.
(Contract AF 61(514)1332)
(GRD-TR-60-411) Unclassified report

DESCRIPTORS: (*Meteorites, Radioactive decay.) (Potassium, Argon, Isotopes, *Radioactivation analysis, *Neutron activation.) (*Cosmic rays, *Spallation, Scandium, Isotopes, Neutron cross sections.) (Particles, Measurement, Tritium, Mesons, Protons.) (Gases, Neon, Helium.) (Experimental data, Tables.) *Bibliography.

Age determinations on stone meteorites with the potassium-argon method using a newly developed technique, by H. Wanke and H. Konig
Scandium 45 as spallation product of the cosmic rays in iron meteorites, by H. Wanke
The potassium contents of chondrites, achondrites, and siderites, by H. Wanke

AD-267 393 Div. 2
(TISTP/MFA) OTS price $6.60

Imperial Coll. of Science and Tech. London (Gt. Brit.).
THE DENSITY AND STRUCTURE OF ICE FORMED BY ACCRETION,
by W. C. Macklin. Aug 60, 65p. incl. illus.
(Technical (scientific) note no. 9)
(Contract AF 61(052)254)
(GRD-TN-60-494) Unclassified report

DESCRIPTORS: (*Ice, *Growth, Density, Structures, Raindrops.) (*Physical properties, Heat transfer, Heat of fusion, Temperature.) (Instrumentation, Wind tunnel models, Cylindrical bodies, Spray nozzles.) (Experimental data, Tables.)

Studies were made of ice formed by accretion over a wide range of controlled conditions to ascertain the influence of the wind speed, ambient temperature, droplet diameter and liquid water concentration in the supercooled cloud, and the size of the accreting object. It is shown that these parameters determine the time of freezing and impact momentum of the supercooled droplets, and thereby also the density and structure of the deposits. Application is made to the growth of hail. (Author)

AD-267 394 Div. 2
(TISTP/MFA) OTS price $2.60

International Meteorological Inst. (Sweden).
NUMERICAL FORECASTING WITH A TWO-PARAMETER BAROCLINIC MODEL OF THE ATMOSPHERE.
Summary of research progress rept. 1 July 58-30 June 59,
by Bo R. Doos. 30 June 59, 23p. incl. illus.
(Contract AF 61(514)1128)
(AFCRL-414) Unclassified report

DESCRIPTORS: (*Atmosphere models, *Weather forecasting, *Mathematical prediction, Meteorological data, Wind.) (Equations of Thermodynamics, Vortices.) (Numerical analysis, Functions, Potential theory, Differential equations.)

Some characteristics of waves in a basic current as described by a two-parameter model are presented. Statistics on the behaviour of the two-parameter model that should be of direct practical value in judging our skill in forecasting by numerical methods to-day are given. (Author)

AD-267 420 Div. 2
(TISTP/MFA) OTS price $2.60

Air Force Cambridge Research Labs., Bedford, Mass.
A STUDY OF SACRAMENTO PEAK FLARES. I: DISTRIBUTION, AREAS AND GROWTH CURVES,
by Henry J. Smith. Apr 61, 21p. incl. illus. table (GRD Research notes no. 59)
(Proj. 7649)
(AFCRL-600) Unclassified report

DESCRIPTORS: (*Solar flares, Astronomical observatories, California.) (Telescopes, *Astronomical data, Measurement.) (Statistical analysis, *Statistical distributions, Functions.)

A brief history of the Sacramento Peak Flare Patrol is given as background for discussion of some statistical properties of 4227 flares. East-west asymmetry of flares exists, but is not statistically significant. Flare distribution in heliocentric longitude is discussed, and criticized as an indication of flare geometry. Area frequency functions in distinct radial zones are applied to determine foreshortening correction factors. Flare growth curves, defined by times of start, maximum, and end, are found to correlate well with maximum area (importance), but not with position on the disk, duration, or estimated intensity. (Author)

AD-267 430 Div. 2
(TISTP/GRW) OTS price $15.00

Reiter, Reinhold (Germany).
RELATIONSHIPS BETWEEN ATMOSPHERIC ELECTRIC PHENOMENA AND SIMULTANEOUS METEOROLOGICAL CONDITIONS. VOLUME I.
Final rept.,
by Reinhold Reiter. July 60, 229p. incl. illus. tables.
(Contract AF 61(052)55)
(AFCRL-415, vol. 1) Unclassified report

DESCRIPTORS: (Germany, *Atmospheric electricity, Atmosphere, Electrical conductance, *Climatic factors.) (Clouds, Precipitation, Ions, Density, Diurnal variations.)

AD-267 431 Div. 2
(TISTP/GRW) OTS price $11.00

Reiter, Reinhold (Germany).
RELATIONSHIPS BETWEEN ATMOSPHERIC ELECTRIC PHENOMENA AND SIMULTANEOUS METEOROLOGICAL CONDITIONS. VOLUME II.
Final rept.,
by Reinhold Reiter. July 60, 146p. incl. illus. tables.
(Contract AF 61(052)55)
(AFCRL-415, vol. 2) Unclassified report

DESCRIPTORS: (Tables, *Atmospheric electricity, Atmosphere, Electrical conductance, *Climatic factors, Germany.) (Clouds, *Electric potential, Ions, Density, Diurnal variations.)

The fine weather behaviour of atmospheric electric potential gradient and conduction current is given for seven stations situated in the Wetterstein Mountains (Germany, South Bavaria). The same fine weather average hourly means of potential gradient and conduction current are compared with the correspondent average hourly means of water vapor pressure, vertical temperature difference between valley and peak station, and potential equivalent temperature. Mean diurnal variations (average hourly means) are given of positive and negative small ions densities as obtained at station Farchant in fine weather. (Author)

AD-267 479 Div. 2, 15
(TISTP/TL) OTS price $2.60

Army Signal Missile Support Agency, White Sands Missile Range, N. Mex.
VARIABILITY OF SURFACE WIND IN SHORT DISTANCES.
Progress rept. no. 1,
by Roy L. Lamberth and Daniel R. Veith. Oct 61, 18p. incl. illus. table.
Unclassified report

DESCRIPTORS: (*Wind, *Statistical analysis, Vector analyses, *Meteorology.) (Correlation techniques, Spectrographic analysis, Data, Recording devices, Instrumentation.) (Harmonic analysis, Mathematical prediction, Weather-forecasting.)

The variability of almost 2,500 pairs of five-second intervals of wind direction and wind speed was studied. Data for the study were obtained from sensors located 12 feet above ground and 50 feet apart in a flat area. By vector correlation techniques an equation was derived for predicting the wind components at one sensor as a function of the other. These predictions are accurate to + or -4.6 mph for 95 percent of the cases. A second approach used 32 pairs of 30-minute intervals of wind data collected with the same sensors at the same site. These 30-minute intervals were separated into five-second series. The time variability of these pairs has been treated with spectral analysis. Although the spectra differed widely, they were similar to usual daytime wind spectra. The cross spectra will be computed later. (Author)

AD-267 488 Div. 2
(TISTP/GRW) OTS price $3.60

Visibility Lab., U. of Calif., San Diego.
SEASONAL SURVEY OF AVERAGE CLOUDINESS CONDITIONS OVER THE ATLANTIC AND PACIFIC OCEANS,
by Catherine R. Fean. Oct 61, 35p. incl. illus.
(SIO Ref. no. 61-27)
(Contract NObs-84075, Proj. S-F018 0201)
Unclassified report

DESCRIPTORS: (*Diurnal variations, Meteorological charts, Atlantic Ocean, Pacific Ocean.) (*Clouds, Meteorological charts, Atlantic Ocean, Pacific Ocean.)

Separate charts were made for percentage frequency of total cloud cover less than 2/10 and for percentage frequency of low cloud amounts more than 6/10. They are presented seasonally by ocean. (Author)

AD-267 515 Div. 2
(TISTP/MFA) OTS price $8.60

Visibility Lab., U. of Calif., San Diego.
ATMOSPHERIC OPTICAL MEASUREMENTS DURING HIGH ALTITUDE BALLOON FLIGHT, PART III. SKY RADIANCES IN THE 400 TO 500 MILIMICRON REGION,
by Almerian R. Boileau. July 61, 95p. incl. illus. (SIO Ref. no. 61-2)
(Contract NObs-72092, Proj. SF001 05 01)
Unclassified report

DESCRIPTORS: (*Sky brightness, *Thermal radiation, Infrared radiation, Atmosphere, Astronomical data, *Optics, Measurement.) (*High altitude, Balloons, Flight, Airplanes.) (Instrumentation, Photometers, Telemetering, Phototubes.)

Certain optical measurements of the atmosphere were made on 21 June 1958 over central Minnesota. Data were recorded from daybreak to midmorning during the time four balloons carrying optical instrumentation from the Geophysics Research Directorate, Air Force Research Division, Bedford, Massachusetts, were floating at higher altitudes. (Author)

AD-267 539 Div. 2, 6
(TISTP/GRW) OTS price $8.60

Stanford Research Inst., Menlo Park, Calif.
WEATHER RADAR SYSTEMS RESEARCH. RESEARCH TOWARD EFFECTIVE USE OF WEATHER RADAR DATA IN WEATHER ANALYSIS AND FORECASTING.
Final rept.,
by Myron G. H. Ligda, Sidney M. Serebreny, and Roland E. Nagle. Jan 61, 82p. incl. illus. tables.
(Contract AF 19(604)3067)
(AFCRL TR 61-200) Unclassified report

DESCRIPTORS: (*Meteorological radar, Effectiveness for Weather forecasting.) (Radar analysis of *Precipitation, *Storms, Air mass analysis.) (*Radar echo areas, Intensity, Meteorological charts, Tables.)

In making weather observations with radar, careful consideration should be given to the duration of and interval between observations. Correct observation interval and duration can serve to facilitate and emphasize certain changes in storms and sometimes suppress or entirely eliminate undesired indications. Experiments and routine operations with unusual observation intervals and durations by means of photographic techniques suggest that improved methods for observation, interpretation, and study of storm

circulations and movements of different magnitude may be readily developed. A possibility exists of finding hitherto unobserved atmospheric motions and variations by experiments with different degrees of time compression of radar observations and by analysis of the indications through narrow band-pass analytical filters, so that only those variations or motions in or of the storm which occurred at narrowly defined rates are displayed. The upper limits of time compression factor which can be used in a given situation appear to be dictated by the amount of time the region of interest in a disturbance remains within radar range. In some cases it may be possible to employ very large time compressions by use of observations over an area, or composite radar observations. (Author)

AD-267 580 Div. 2
(TISTP/GRW) OTS price $8.60

Wave Research Lab., U. of Calif., Berkeley.
BEACHES NEAR SAN FRANCISCO, CALIFORNIA, 1957-1958,
by Parker D. Trask and David T. Snow. Oct 61, 90p. incl. illus. tables (Series no. 14, Issue no. 23)
(Contract DA 49-055-eng-8)
Unclassified report

DESCRIPTORS: (*Beaches, California, San Francisco Bay.) (Sand, Sources, Transportation, *Erosion, Sampling.)

Eighteen profiles on beaches in the vicinity of San Francisco were occupied at intervals of 2 to 6 months from July 1957 to December 1958. Seven of these profiles are north of the Golden Gate and eleven are south. Individual beaches differ from one another and the same beach differs from season to season and from place to place at any given time. The data collected neither support nor disprove the notion that beach sand is statistically finer and better sorted in summer than in winter. Likewise, the data do not support the contention that finer grained sands are better sorted. (Author)

AD-267 581 Div. 2
(TISTP/MFA) OTS price $1.10

Cornell U., Ithaca, N. Y.
POSTGLACIAL SUBMERGENCE OF THE CONNECTICUT COAST. Progress rept. for Sep 61,
by Arthur L. Bloom. 1 Dec 61, 3p.
(Proj. 388-065)
Unclassified report

DESCRIPTORS: (*Geology, Glaciers, Swamps, Terrain, Cennecticut, Paleoecology.) (Radioactivity, *Carbon dating, Radioactive decay.) (*Sedimentation, Sand, Rock.)

The overwhelming factor in the postglacial geomorphic history of the Connecticut coast has been progressive submergence of at least 38 feet (11.6 meters) and probably much more. The history of the submergence is recorded in the stratigraphy of the tidal marshes, including both salt- and fresh-water marshes in estuaries and lagoons. Systematic coring was made of all the tidal marshes on the Connecticut coast to collect for radiocarbon dating samples that were deposited in a known environment, usually at or near high-tide level, from a known depth below present high-tide level. (Author)

AD-267 599 Div. 2, 15
(TISTP/MFA) OTS price $2.60

International Meteorological Inst. (Sweden).
ON THE USE OF INTERNAL CORRELATION FUNCTIONS FOR VERIFICATION PURPOSE.
Final technical rept., 1 July 59-30 June 60, by Bo R. Doos. 30 June 60, 26p. incl. illus.
(Contract AF 61(514)1128)
(AFCRL-411) Unclassified report

DESCRIPTORS: (*Weather forecasting, *Atmosphere models, Flight paths, Errors, Meteorological data.) (Aircraft, Flight, Pilots.) (*Numerical analysis, Motion, Equations, Partial differential equations, Transformations (Mathematics), Perturbation theory.)

The simple barotropic model of the atmosphere has proven to be a very useful tool in present methods for numerical weather forecasting, while more complicated models (2 or more parameters) have not increased the forecast accuracy significantly. In summarizing our capability to forecast for one or two days particularly winds for aviation purposes conventional measures are not sufficient. A method for computing the average forecast error in a flight path as a function of the accuracy of the forecast has therefore been developed. (Author)

AD-267 657 Div. 2
(TISTP/GRW) OTS price $1.10

Naval Ordnance Test Station, China Lake, Calif.
THE GEOGRAPHIC POSITIONS OF THE STABLE RED ARCS OF OCTOBER 25 AND OCTOBER 26, 1960,
by James G. Moore. 1960, 6p. incl. illus.
Unclassified report

DESCRIPTORS: (*Magnetic storms, Photographic analysis, Color photography, Photometers, Night sky, Tracking.) (Aurorae, *Ionospheric disturbances.)

A stable red arc was observed from Cactus Peak, Calif. shortly after moonset on two successive nights during October 1960. During the night of October 24-25, the arc was observed to form in the direction of the north magnetic pole and to move rapidly southward, opening up so that it lay along an isoclinic line, until it reached a stable position at a dip latitude of 52.5 degrees. On the night of October 25-26, the arc lay along an isoclinic at a dip latitude of 50.5 degrees at moonset, and showed slow southerly motions during the night. (Author)

AD-267 709 Div. 2, 12
(TISTA/SEB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
LOOK OUT: METEOR,
by V. Fedynskiy. 22 Nov 61, 2p. (Trans. no. FTD-TT-61-222 of Kazakhstan Pravda, No. 234 (11067) pp. 4, 4 Oct 61)
Unclassified report

DESCRIPTORS: (Space flight, Orbital flight paths, *Meteors.) (Technological intelligence, Translations, USSR.)

A general discussion is presented on the dangers of meteors to spacecraft in space flights.

Division 2 - ASTRONOMY, GEOPHYSICS AND GEOGRAPHY

AD-267 731 Div. 2
(TISTP/GRW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FAR-ULTRAVIOLET ASTRONOMY,
by I. P. Tindo. 21 Nov 61, 12p. incl. illus.
(Trans. no. FTD-TT-61-116 of Nauka I Zhizn' 11:41-45, 1960)
Unclassified report

DESCRIPTORS: (*Astronomy, Ultraviolet research, USSR.) (*Ultraviolet radiation, X rays, Solar energy, Galaxies, Sky.) (Translations, USSR.)

AD-267 790 Div. 2
(TISTP/WH) OTS price $3.60

Florida State U., Tallahassee.
THE STRATOSPHERIC WARMING OVER NORTH AMERICA IN 1957. III. HEIGHT, TEMPERATURE, VORTICITY AND VERTICAL MOTION AT THE 25-MB SURFACE,
by Richard A. Craig and M. A. Lateef. 1 Nov 61, 31p. incl. illus. (Scientific rept. no. 3)
(Contract AF 19(604)5471)
(AFCRL-1040) Unclassified report

DESCRIPTORS: (*Stratosphere, *Temperature inversion, Meteorological charts, North America.) (Meteorological data, Vortices, Turbulence, Height finding.)

This report continues the discussion of meteorological conditions in the stratosphere over North America during the stratospheric warming of January - February 1957. Conditions at 25 mb are discussed, with emphasis on the temperature, height, and vertical-motion patterns. (Author)

AD-267 804 Div. 2
(TISTP/MFA) OTS price $2.60

Technische Hochschule, Karlsruhe (Germany).
THE SIZE OF RAINDROPLETS.
Final technical rept., 1 June 60-31 May 61,
by M. Diem. Oct 61, 14p. illus.
(Contract DA 91-591-EUC-1477)
Unclassified report

DESCRIPTORS: (Meteorology, *Meteorological data, *Raindrops, *Analysis, Clouds, Precipitation, Measurement.) (Experimental data, Tables.) Translations, Germany.

Measurements about size and number of the droplets of rainfalls confine themselves to a few thousand drops at most. The only exception are the comprehensive measurements, conducted by DEFANT, which were analysed less with regard to cloud-physical aspects than with regard to statistical and mathematical features. We therefore have tried to get a material as comprehensive as possible, from which data about the structure and synthesis of the rain can be obtained on the one hand and the relation between the structure of the clouds and the precipitations be found on the other hand. The results to be understood only and exclusively in relation to the cloud-physical studies. (Author)

AD-267 805 Div. 2
(TISTP/GRW) OTS price $2.60

Technische Hochschule, Karlsruhe (Germany).
THE SPEED AND DIRECTION OF WINDS IN DIFFERENT ELEVATIONS IN A PLAIN AND IN HILLS, AND THE CORRESPONDING AEROLOGICAL FIELD.
Final technical rept., 1 June 60-31 May 61,
by M. Diem. Oct 61, 11p. tables.
(Contract DA 91-591-EUC-1478)
Unclassified report

DESCRIPTORS: (Tables of *Wind, Measurement for Velocity, Direction finding.) (*Meteorological instruments, Wind direction indicators, Meteorological balloons, Radiosondes, Vertical gust recorders.) (Tests, Experimental data, Germany, Terrain.)

A number of technical problems depend largely on the alteration of the wind velocity and wind direction incidental to the variation of height in the zone near the ground. For example, the disposition of dust, gas and radioactive substances in the atmosphere is determined by the vertical distribution of wind. A series of measurements was conducted. For the recording of narrowly limited local differences, one measuring point was established in the Rhine-Valley near Karlsruhe and another one some 40 km away in the hill-country of the Black Forest near Muhlacker. The measurements are taking place synchronously and thus give a glimpse of the locally conditioned structure of the wind. (Author)

AD-267 819 Div. 2
(TISTP/MFA) OTS price $1.60

Technische Hochschule, Karlsruhe (Germany).
THE NUMBER AND SIZE OF CLOUDDROPLETS ON MOUNTAINS AND FREE ATMOSPHERE.
Final technical rept., 1 June 60-31 May 61,
by M. Diem. Oct 61, 15p. incl. illus. tables.
(Contract DA 91-591-EUC-1476, Proj. OI 4617-60)
Unclassified report

DESCRIPTORS: (Meteorology, Meteorological data, *Clouds, *Drops, *Mountains, Measurement, *Atmosphere.) (Tests, Airplanes, Instrument panels.) (Test methods, Photographic analysis, Microphotography.) Tables.

Series of measurement were made concerning the structure of the clouds by RITTBERGER, who measured size and number of the drops on the Feldberg in the Black Forest and found the following theses: (1) at the small spectra no rain at all or only for a short time will appear, (2) broad spectra are mostly accompanied by rain over longer time, (3) spectra in high fog are on principle differing from spectra in other clouds, and (4) the three phases water-vapour, liquid-water and frozen water can be existent simultaneously for a longer time. In order to check these theses set up by RITTBERGER, similar measurements were made upon the Hochalpine Forschungsstation Jungfraujoch in the Central Alps of Switzerland. At the same time the precipitation in the valleys was analysed carefully. In order to be able to control and generalize the results measured on mountain stations, flights were performed for measurements in the free atmosphere. (Author)

AD-267 833 Div. 2
(TISTP/WH) OTS price $5.60

Washington U., Seattle.
PRELIMINARY INVESTIGATIONS OF THE MARINE GEOLOGY OF THE SOUTHEASTERN CHUKCHI SEA. BROWN BEAR CRUISE NO. 236, 1 AUGUST TO 2 SEPTEMBER 1959, by Joe S. Creager and Dean A. McManus. May 61, 46p. incl. illus. tables (Technical rept. no. 68; Ref. no. 61-15)
(Contract Nonr-47710, Proj. NR 083-012)
Unclassified report

DESCRIPTORS: (*Oceanography, Chukchi Sea.) (*Oceanographical data, Bathythermograph data, Ocean bottom, Sedimentation, Minerals, Foraminifera.) (Calcium compounds, Carbonates.) (Organic compounds, Carbon.)

An intensive oceanographic survey was conducted of the southeastern portion of the Chukchi Sea from 1 August to 2 September 1959. The marine geological phase of the survey is considered. The geological studies were confined to the offshore water. The discussion of the bathymetry and marine geology is based on 2,600 nautical miles of sounding data and on 120 surface grab samples and 11 short gravity cores. The soundings were made with EDO echo sounders Models AN/UQN 1B and 255C, operated throughout the survey on 1-foot interval scales. The cruise track was planned to provide sounding lines normal to the coastal configuration. (Author)

AD-267 834 Div. 2
(TISTP/JW) OTS price $12.00

Washington U., Seattle.
PHYSICAL AND CHEMICAL DATA FOR THE EASTERN CHUKCHI AND NORTHERN BERING SEAS. BROWN BEAR CRUISE 236 - 2 AUGUST TO 1 SEPTEMBER 1959. BROWN BEAR CRUISE 268-26 JULY TO 28 AUGUST 1960, by Richard H. Fleming. Aug 61, 162p. incl. illus. (Technical rept. no. 69; Ref. no. M61-24)
(Contract Nonr-47710, Proj. NR 083 012)
Unclassified report

DESCRIPTORS: (Oceanography, *Sea water, Salinity, Temperature charts, Oxygen.) (*Oceanographical data, Chukchi Sea, Oceanographic vessels.)

AD-267 862 Div. 2, 25
(TISTP/WH) OTS price $2.60

Electrical Engineering Research Lab., U. of Texas, Austin.
LUNAR RADIATION AT 4.3 MM DURING THE 25 AUGUST 1961 ECLIPSE AND THE LUNAR MODEL, by C. W. Tolbert, L. C. Krause, and R. M. Dickinson. 15 Nov 61, 11p. incl. illus. (Rept. no. 125)
(Contract Nonr-37514, Proj. NR 371-032)
Unclassified report

DESCRIPTORS: (*Moon, Electromagnetic waves, Measurement, Solar eclipse.) (*Moon, Infrared radiation, Thermal radiation, Measurement, Antennas, Antenna radiation patterns, Radiometers.)

This analysis describes the 4.3 mm wavelength measurement of lunar emissions during a lunation and during the 25 Aug 1961 eclipse, the results of the measurements and the relationship of the results to measurement at other wavelengths. The maximum and minimum temperatures observed with a 0.2 degree beamwidth antenna during a lunation was 260 and 145 K respectively. The temperature change associated with the lunar occultation during the eclipse was approximately 10 C. The temperature change during the eclipse is hypothesized as being associated with the change in temperature of the dust layer. (Author)

AD-267 923 Div. 2, 4, 16
(TISTA/VGW) OTS price $1.10

Science and Tech. Branch, Aerospace Information Div., Washington, D. C.
LIFE ORIGIN ON PLANETS: SPONTANEOUS SYNTHESIS OF AMINOACIDS.
29 Nov 61, 2p. (AID rept. 61-158; Trans. of Effect of Catalysts and the Period of Irradiation on the Photosynthesis of Aminoacids in the Mixture of Paraformaldehyde and Potassium Nitrate. Zhurnal Obshchey Khimii 31:3017-3020, Sep 61)
Unclassified report

DESCRIPTORS: (*Photosynthesis of *Ammino acids in Mixtures of Formaldehyde, Potassium compounds, Nitrates, Chromatographic analysis.) (Spectrographic analysis of Formaldehyde in Venus, Atmosphere.) (Animals, Plants, Microorganisms, Synthesis.) (Catalysts, Cobalt catalysts, Nickel catalysts, Effectiveness.)

AD-267 927 Div. 2, 25
(TISTP/WH) OTS price $4.60

Science and Tech. Branch, Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE. REVIEW OF SOVIET LITERATURE.
Monthly rept. no. 18 for Oct 61.
31 Oct 61, 38p. incl. illus. table, 18 refs.
(AID rept. 61-147)
Unclassified report

DESCRIPTORS: (*Astrophysics, Geophysics, Bibliography, USSR, Translations.) (*Upper atmosphere, Ionosphere, Literature, USSR.) (Solar energy, Ionosphere, Van Allen radiation belt, Cosmic rays, Satellite vehicles, Guided missles, Meterorological data.)

Soviet developments in selected problems in astrophysics and geophysics are treated. The following topics are discussed: solar radiation and the ionosphere, Van Allen belts and cosmic rays, telluric currents, satellite and missile data and the meteorology of the upper atmosphere. (Author)

AD-267 929 Div. 2, 25
(TISTP/WH) OTS price $3.60

Science and Tech. Branch, Aerospace Information Div., Washington, D. C.
PHENOMENA IN THE UPPER ATMOSPHERE. REVIEW OF SOVIET LITERATURE.
Monthly rept. no. 19 for Nov 61.
30 Nov 61, 31p. incl. illus. 20 refs.
(AID rept. 61-153)
Unclassified report

DESCRIPTORS: (*Upper atmosphere, Literature,

USSR, Translations.) (*Geophysics, *Astrophysics, Bibliography, USSR.) (Meteorological data, Solar energy, Ionosphere, Van Allen radiation belt, Cosmic rays, Atmospheric electricity, Satellite vehicles, Guided missiles.)

Soviet developments in selected problems in astrophysics and geophysics are treated. The following topics are discussed: solar radiation and the ionosphere, Van Allen belts and cosmic rays, atmospheric electricity, satellite and missile data, and the meteorology of the upper atmosphere. (Author)

AD-267 942 Div. 2, 20
(TISTP/MFA) OTS price $2.60

Radiation Lab., U. of Calif., Berkeley.
THE NEUTRINO PROBLEM IN COSMOLOGY,
by Steven Weinberg. Sep 61, 18p. (UCRL-9855)
(Contracts AF 49(638)327 and Nonr-22260)
(AFOSR-1461) Unclassified report

DESCRIPTORS: (*Astrophysics, *Astronomy, *Stars, *Light, Photons.) (*Neutrinos, Absorption, Brightness, Reflection, Neutrino cross sections, Oscillation.) (Partial differential equations, Integrals.) Relativity theory.

The absence of an Olbers paradox for neutrinos shows that the average neutrino luminosity must fall off as we observe older and more distant parts of the universe. Unlike the situation for light, the paradox could not be avoided by any kind of red shift, and hence puts a strong constraint on cosmological speculation. The ambient neutrino flux turns out to be finite in the modern steady state or evolutionary cosmologies, and is estimated at about 10,000 neutrinos/sq cm-sec, a density less than that allowed by the Pauli Principle by a factor of about 10 to the -37th power. Taking absorption of neutrinos into account does not affect these remarks, except that in the oscillating cosmologies there must recur periods when neutrino absorption is faster than neutrino emission. It is estimated that the onset of neutrino absorption for an oscillating universe comes when it has contracted by a (linear) factor of about 100,000, and absorption might not lower the neutrino population very much until the contraction reaches about 10 to the 14th power. Even then there is no neutrino degeneracy. (Author)

AD-267 979 Div. 2
(TISTB/LH) OTS price $14.00

Institute of Science and Tech., U. of Michigan, Ann Arbor.
A BIBLIOGRAPHY OF SEISMOLOGY FOR THE VELA UNIFORM PROGRAM. A REPORT OF VESIAC,
by W. D. McLean and T. W. Caless. Nov 61, 205p.
(Rept. no. 4410-10-B)
(Contract SD-78)
Unclassified report

DESCRIPTORS: (*Bibliography, *Earthquakes, Underground explosions, Nuclear explosions, Seismic waves, Geology, Geophysics, Electromagnetic waves, Detection, Measurement.)

AD-267 981 Div. 2
(TISTP/JW) OTS price $3.60

Manchester U. (Gt. Brit.).
STUDIES IN LUNAR TOPOGRAPHY. VIII. A CATALOGUE OF MEASURED HEIGHTS IN THE REGIOMONTANUS AND HELL PLAIN REGION OF THE MOON,
by Geoffrey Turner. June 60, 34p. incl. illus.
(Technical scientific note no. 8)
(Contract AF 61(052)168)
(AFCRL TN 60-831) Unclassified report

DESCRIPTORS: (*Moon, *Mapping, Height finding.) (Photographic analysis, Geodetic astronomy, Topographic cameras, *Extraterrestrial geography.)

A catalogue is presented of measured relative heights in the region of the Moon around the craters, Regiomontanus, Purbach and the Hell Plain. The co-ordinates of the tip of the measured shadows are given in each case and the method of their computation is described. Five hundred and ten measures of two hundred and nine points are quoted for this region. (Author)

AD-267 984 Div. 2, 25
(TISTP/WH) OTS price $10.00

New York U., Coll. of Engineering, N. Y.
A RE-EXAMINATION OF THE HEAT BUDGET OF THE TROPOSPHERE AND LOWER STRATOSPHERE,
by Paul. A. Davis. Oct 61, 115p. incl. illus. tables (Scientific rept. no. 3)
(Contract AF 19(604)6146)
(AFCRL-1020) Unclassified report

DESCRIPTORS: (*Atmosphere, *Stratosphere, Heat, *Entropy, Enthalpy.) (Meteorological data, Meteorology, Infrared radiation, Cooling, *Atmospheric models, Solar energy, Absorption.)

With the aid of recent climatological data and laboratory radiation data, a meridional heat budget analysis is formed for the atmosphere between 20 and 70 N latitude. Components and requirements of the budget are presented as a function of height, latitude, and season from the earth's surface to the 25 millibar level. Components of the budget include infrared radiative cooling, solar heating, net latent heating, heating from the lower boundary, and the rate of heat storage. Balance requirements are those demanded of the atmospheric motions alone. Each item of the budget is discussed and several comparisons with related studies are made. Emphasis is given to the infrared cooling. Assumptions and methods adopted for the radiative calculations are reviewed. While total columnar budgets revealed a local deficit of heat almost everywhere within the model, an extensive lower layer of excessive heating was found everywhere outside of the arctic winter region. Indications were that the net budget deficits in the polar latitudes would be balanced by the large-scale isobaric eddy heat flux convergences. For the sub-tropical latitudes of the model, heating is demanded from mean meridional motions. (Author)

AD-267 987 Div. 2, 25
(TISTA/VGW) OTS price $2.60

New York U., Coll. of Engineering, N. Y.
SATELLITE OBSERVATIONS OF INFRARED RADIATION.

Final rept.,
by Julius London, Katsuyuki Ooyama, and Herbert Viebrock. Oct 61, 21p. incl. illus.
(Contract AF 19(604)5955)
(AFCRL-1037) Unclassified report

DESCRIPTORS: (Earth, Reflection, Atmosphere, *Infrared radiation, Infrared spectroscopy, Thermal radiation, Measurement for Weather forecasting, *Meteorology.) (Satellite vehicles, Satellite attitude, Infrared equipment, Infrared optical systems, Infrared windows, Meteorological data, Mathematical prediction, Mathematical analysis.)

The problem of atmospheric radiation geometry is considered to determine the efficiency with which observed satellite data could be used to calculate components of the radiation budget of the atmosphere. For this purpose, and as an aid in interpretation of satellite observations, the anisotropy of the out-going radiation intensity at the top of the atmosphere and at the satellite level is studied. (Author)

AD-267 992 Div. 2, 20
(TISTP/MFA) OTS price $2.60

Max-Planck-Institut fuer Chemie, Mainz (Germany).
CHLORINE 36 AS SPALLATION PRODUCT OF THE COSMIC RAYS IN METEORITES AND THE EXPOSURE AGE OF IRON METEORITES.
Annual rept. no. 1,
by E. Vilcsek and H. Wanke. 1 Mar 61, 20p. incl. tables.
(Contract AF 61(052)334)
(AFCRL-424) Unclassified report

DESCRIPTORS: (*Meteorites, *Cosmic rays, *Chlorine, Radioactive isotopes, *Spallation.) (Particles, Nuclei, Radioactive decay, Beta decay.) (Experimental data, Tables.)

Chlorine 36, which is produced by the interaction of cosmic ray particles with the nuclei of the meteorites, was measured in seven iron meteorites and in one stone meteorite. The decay rates for chlorine 36 in iron meteorites varied between 6.5 and 20.2 dpm/kg. The chlorine 36 values together with the concentration of stable spallation products allowed us to calculate the exposure ages of these meteorites. By this way we found for six of the meteorites examined exposure ages close to 500 million years. Only for the Sikhote Alin meteorite the quite different exposure age of 60 million years was measured. As this value is also definitely lower than that found by other authors for this meteorite, it is suggested that the Sikhote Alin had been part of a bigger meteorite which was broken into pieces about 60 million years ago by a collision with another meteorite. (Author)

AD-267 997 Div. 2, 7
(TISTE/NTM) OTS price $5.60

DECO Electronics, Inc., Boulder, Colo.
ELECTRICAL CONDUCTIVITY MEASUREMENTS OF THE EARTH AT AUDIO FREQUENCIES,
by E. L. Maxwell, A. J. Farstad and others.
28 Nov 61, 53p. incl. illus. 12 refs. (Rept. no. 30-F-1)
(Contract Nonr-338700, Proj. NR 371-590)
Unclassified report

DESCRIPTORS: (*Electrical conductance, Measurement, *Earth, *Audiofrequency, Magnetic fields, Electric fields, Impedance, Electrodes.) (*Electromagnetic waves, *Electromagnetic fields, Propagation, Soils.)

Ground conductivity measurements from 20 to 16,000 c were made with electrical sounding techniques to a maximum depth of 8 km. Soundings were taken at 2 locations - Boulder, Colorado and Pole Mountain District of the Medicine Bow National Forest, Wyoming. The very deep soundings at Pole Mountain indicated a very low conductivity (10-5 mhos/m or less) for the basement of the earth's crust. Frequencies above 200 c yielded conflicting results at depths large compared to a skin depth. At relatively shallow depths, however, results appear to be valid at all frequencies used and indicate the displacement currents may be neglected. The electrical conductivity of earthen materials in situ were also obtained from intrinsic impedance measurements. These were in effect audio Magneto-Telluric measurements with lightning providing the source of energy. Results were obtained at frequencies from 12 to 330 c and are compared with electrical sounding data. (Author)

AD-268 003 Div. 2, 6
(TISTP/JW) OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
COMPARISONS OF RADAR PRECIPITATION AND SATELLITE CLOUD OBSERVATIONS,
by Roland E. Nagle and Roy H. Blackmer, Jr.
Nov 61, 38p. incl. illus. (Scientific rept. no. 2)
(Contract AF 19(604)5982)
(AFCRL-1024) Unclassified report

DESCRIPTORS: (Meteorological data, Meteorological radar, Statistical analysis, Radar echo areas, Photographic analysis.) (Radar tracking, Clouds, *Precipitation.) (Satellite vehicles, Data processing systems.)

A program is described which is designed to provide data for evaluating precipitation-to-cloud relationships in association with the TIROS I meteorological satellite experiment. Preliminary results of satellite cloud and radar precipitation observation comparisons are presented. Data-handling procedures and difficulties encountered in working with the satellite observations are described. From subjective comparisons, precipitating clouds were found to be highly reflective, but the converse is not necessarily true. Clear or scattered, sharp-edged cloud areas within or in juxtaposition to extensive cloud systems sometime appear to parallel areas of precipitation within the system. It was found that the radar echoes can sometimes be used to locate and orient satellite pictures when other data are lacking or insufficient. In contrast to the spectacular cloud patterns revealed in the satellite pictures, no obvious nor unique relationships were found which distinguish precipitating from non-precipitating clouds. Preliminary studies re-emphasize the low percentage of clouds that precipitate. (Author)

AD-268 018 Div. 2
(TISTP/JW) OTS price $1.10

Air Weather Service, Scott Air Force Base, Ill.
WIND VARIABILITY AT 150,000 FEET,
by Herbert S. Appleman. Oct 61, 7p. incl.

illus. tables (Technical rept. no. 160)
Unclassified report

DESCRIPTORS: (*Wind, Climatic factors, Weather forecasting, Radiosondes.) (Space probes, *Space flight, Air mass analysis, Stratosphere, Upper atmosphere.)

The advent of the X-15, Dyna-Soar, and other vehicles operating at very high altitudes require increased familiarity with winds above the normal radiosonde levels. A number of articles have already been published on the subject of high-level circulation patterns. The present report makes use of the available rocketsonde data to determine the accuracy of climatological and persistence forecasts at 150,000 feet. (Author)

AD-268 043 Div. 2
(TISTP/JW) OTS price $1.10

British Columbia U. (Canada).
RESEARCH CONCERNING GEOMAGNETIC FLUCTUATIONS. Final rept.
by J. A. Jacobs. 19 Jan 61, 8p.
(Contract AF 19(604)4068)
(AFCRL-249) Unclassified report

DESCRIPTORS: (*Geophysics, Magnetic fields, Electric fields, *Electromagnetic fields.) (Pulse modulation, Test methods.)

AD-268 066 Div. 2, 25
(TISTP/JW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
SECRETS OF THE OCEAN OF AIR,
by A. Presnyakov. 1 Dec 61, 2p. (Trans. no. FTD-TT-61-283 of Ekonomicheskaya Gazeta, No. 7, p. 34, 18 Sep 61)
Unclassified report

DESCRIPTORS: (Translations, USSR.) (Atoms, *Recombination reactions, *Dissociation, Energy.) *Atmosphere, Recombination ramjet engines, Free radicals, Gases.

AD-268 070 Div. 2, 9
(TISTA/SEB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
METEOR-ROCKET,
by G. Pokrovskiy. 1 Dec 61, 4p. (Trans. no. FTD-TT-61-190 of Tekhnika Molodezhi, No. 1, pp. 37, 1961)
Unclassified report

DESCRIPTORS: (*Meteors, Acceleration, Deceleration, Theory.) (*Plasma physics, Gas ionization, Atmosphere entry.) (*Translations, Technological intelligence, USSR.)

Meteors exist having abnormally high velocities which they could not have in cosmic space. It is possible that these meteors are self-accelerating by a method described. (Author)

3. CHEMICAL WARFARE EQUIPMENT AND MATERIALS

AD-267 159 Div. 3, 6, 10
(TISTA/SEB) OTS price $.75

Patterson Moos Research Div., Leesona Corp., Jamaica, N. Y.
FEASIBILITY STUDY OF A MULTIPURPOSE INFRARED PROPELLANT DETECTOR,
by R. Buscaglia and S. Wallack. Aug 61, 52p. incl. illus.
(Contract AF 33(616)6412, Proj. no. 7165)
(ASD TR 61-382) Unclassified report

DESCRIPTORS: (Propellants, Liquid rocket propellants, Rocket oxidizers, *Rocket fuels, Vapors, Detection, Measurement, Detectors, *Infrared detectors, Design, Tests, Feasibility studies.) (Hydrazine, Methyl hydrazine, Ethylenes, Oxides, Nitrogen compounds, Tetroxides.) (Measurement, Detection of Atmosphere, Contamination by Toxicity, Poisonous gases, Liquid rocket propellants, Vapors.) Toxic agent alarms.

The investigation concerned determining the feasibility of developing open-path narrow absorption infrared (NAIR) instrumentation capable of detecting and measuring very low atmospheric concentrations of various toxic propellant vapors. A novel measurement system was conceived and a prototype was fabricated. Because of the unique spectral response characteristics of the NAIR detector, it was possible to combine in this one instrument the desirable features of both single and double beam instrumentation. The system was applicable to ethylene oxide, UOMH N2O4 and N2H4. Tests demonstrated system feasibility.

AD-267 347 Div. 3
(TISTE/CRJ) OTS price $4.60

Aircraft Armaments, Inc., Cockeysville, Md.
E41R1 POINT SOURCE GAS ALARM.
Engineering progress rept. 22 July-2 Sep 61,
by E. B. Tyler. Sep 61, 44p. incl. illus.
(Rept. no. ER-2490)
(Contract DA 18-108-cml-6553)
Unclassified report

DESCRIPTORS: (*Gas detectors, *Toxic agent alarms, Reliability, Tests, Design.) (Gas pumps, Electric motors, Vacuum switches, Acoustic horns.)

The research, development, test and evaluation of the E41R1 Point Source Gas Alarm has progressed toward the improvement of alarm performance and reliability and has included continued efforts in the following areas: (a) testing of original and experimental design in air pumps, (b) investigation of improved alarm horn performance and reliability, (c) continued effects to improve the sensitivity and stability of the photometer including the inherent problems associated with the photocell, (d) investigation of engineering feasibility consideration in a redesign of a remote warning unit, and (e) investigation of condensation (air lines). (Author)

AD-267 365 Div. 3, 16
(TISTB/CCH) OTS price $13.50

Army Chemical Research and Development Labs., Army Chemical Center, Md.
ON THE MECHANISM OF INHIBITION OF T2 BACTERIOPHAGE BY MUSTARD GAS.
by Bruno Papirmeister. Oct 61, 198p. incl. illus. tables, 115 refs. (CRDL Special pub. no. 2-45)
(Proj. no. 4C08-02-022)
Unclassified report

DESCRIPTORS: (Inhibition of *Bacteriophages by *Mustard gas, Nucleic acids.) Synthesis, Cells (Biology). Growth, Reproduction.

The object of this study was to investigate the mechanism by which mustard gas inhibits cellular reproduction, with the eventual goal of establishing a rationale for reversal of the lethal damages. The T2 bacteriophage system was used as a model for investigating the action of the agent on biochemical and genetic aspects of reproduction. The effect of mustard gas on the in vitro synthesis of deoxyribonucleic acid was also studied. The findings were discussed at length with respect to the site of action of mustard gas, some genetic and metabolic consequences to the virus, and some possible approaches to therapy. (Author)

AD-267 653 Div. 3, 4
(TISTM/EJH) OTS price $1.60

Naval Ammunition Depot, Crane, Ind.
QUANTITATIVE CHEMICAL ANALYSIS OF A GREEN SMOKE COMPOSITION,
by William Ripley and Vance Need. 26 July 61, 11p. incl. table (Rept. no. RDTR no. 22)
Unclassified report

DESCRIPTORS: (*Pyrotechnics, *Smokes, *Colored smokes, Mixtures, Chemical analysis, Quantitative analysis, Gravimetric analysis, Polarographic analysis, Titration, Spectrographic analysis.) (*Dyes, Toluidines, Anthraceneds Quinones.) (Gold compounds, Amines, Hydrogen compounds, Chlorides.) (Sucrose, Starches.) (Potassium compounds, Chlorates.) (Sodium compounds, Carbonates.) (Silicon compounds, Dioxides.)

The quantitative analysis of a smoke composition of green dye (a mixture of 1,4-di-p-luidinoanthraquinone and auramine hydrochloride), powdered sugar containing approximately 3% starch, potassium chlorate, sodium bicarbonate, silocel, and collodial silicon dioxide binder is described. Components soluble in water made slightly alkaline are removed and analyzed. Silica is isolated as a insoluble component, ignited, and determined gravimetrically. The % of volatiles is found gravimetrically by means of vacuum drying. 1,4-di-p-toluidinoanthraquinone and auramine hydrochloride are determined spectrophotometrically. Starch is estimated from the % sucrose found. (Author)

4. CHEMISTRY

AD-267 102 Div. 4
(TISTM/EJH) OTS price $6.60

Research Chemicals Div., Nuclear Corp. of America, Burbank, Calif.
THE PREPARATION OF HIGH PURITY RARE EARTH METALS,
by Bernard Love. June 61, 44p. incl. tables, 257 refs. (Scientific rept. no. 1)
(Contract AF 19(604)7491)
(AFCRL-554) Unclassified report

DESCRIPTORS: (Minerals, Ores, *Rare earths, Lanthanum, Cerium, *Praseodymium, Neodymium, Samarium, *Europium, *Gadolinium, Terbium, Dysprasium, Holmium, Eubium, Thulium, Ytterbium, *Lutecium, Scandium, Yttrium, Separation, Purification.) (Processing, Fractionation, Solvent extraction, Chemical reactions, Oxidation-reduction reactions, Reduction, Electrolysis, Exchange reactions, Ion exchange resins, Zone melting, Chemical analysis, Spectrographic analysis.) *Bibliography.

A literature survey of the preparation of high purity rare earth metals was made. The problem was considered with respect to occurrence of the elements, their recovery and separation, methods of reduction and purification, and analytic problems. Oxidation-reduction methods where applicable, and ion exchange methods, are currently the best available for rare earth separations. Metallothermic reductions are most generally used for preparation of the elemental metal. (Author)

AD-267 148 Div. 4, 25
(TISTM/EJH) OTS price $.50

Materials Central, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
EFFECT OF FLUORINE ON THE CARBONYL STRETCHING FREQUENCY OF ESTERS.
Rept. for Dec 60-Jan 61 on Chemistry and Physics of Materials,
by Jack Radell and L. A. Harrah. May 61, 8p. (Proj. 7360)
(ASD TR 61-110) Unclassified report

DESCRIPTORS: (*Esters, Organic acids, Alcohols, Fluorination, Fluorine, *Carbonyl radicals, *Chemical bonds, Molecular structure, Molecular spectroscopy.) (Theory, Spectrographic analysis, Infrared spectroscopy.)

The carbonyl stretching frequencies of 19 esters of perfluorinated normal acids and 17 esters of partially fluorinated normal alcohols were measured with a precision of 1/.5 cm. The carbonyl stretching frequencies of the fluorinated esters were found to be consistently higher than the carbonyl stretching frequencies of the corresponding unfluorinated esters and dependent on the amount and position of the fluorine substituents. Equations are presented for the behavior of the carbonyl stretching frequency as a function of fluorine position and number and the carbonyl stretching frequencies in the esters with fluorine substitution in the alkyl segment. (Author)

AD-267 160 Div. 4, 14
(TISTM/EJH) OTS price $1.60

Frick Chemical Lab., Princeton, N. J.
RHEOLOGY OF POLYTETRAFLUOROETHYLENE,
by A. V. Tobolsky, D. Katz and M. Takahashi. 21 Nov 61, 6p. illus. tables (ONR Technical rept. no. RLT-39)
(Contract Nonr-185807, Proj. NR 356-377)
Unclassified report

DESCRIPTORS: (*Heat resistant polymers, *Plastics, *Polymers, *Fluorides, *Ethylenes, Crystals, High temperature research, Melting, Viscosity, Elasticity, *Plastic flow, Relaxation time, Temperature, Decomposition, Mechanical properties, Theory.)

There seems to be no influence of the degree of crystallinity at room temperature on the viscoelastic behavior of polytetrafluoroethylene above the melting point of the polymer. The correlation time between the maximum relaxation time and temperature is the same as that defined by the Williams-Landel-Ferry equation for other polymers and by its use we obtain a value of T sub g equals 110 C for teflon. The degradation of the polymer is appreciable at temperatures above 380 C. The molecular weight distribution of the sample we used appeared to be sharp. (Author)

AD-267 293 Div. 4, 25
(TIPSM/EJH) OTS price $3.60

Oslo U. (Norway).
INVESTIGATION OF MOLECULAR STRUCTURES.
Final technical rept.,
by O. Hassel. 21 Aug 61, 37p. incl. illus. 12 refs.
(Contract AF 61(052)71)
(AFOSR-1643) Unclassified report

DESCRIPTORS: (Solids, *Complex compounds, Halocarbons, *Halogen compounds, *Organic compounds, Amines, *Molecular structure, *Chemical bonds, Crystal structure.) (Halogen compounds of Ethers or Ketones or Thio radicals, Ethers or Amines or Pyridines.) (Iodides, Methanes or Oxalyl radicals, Halides and Organic compounds.) (Theory, Test methods, X-ray spectroscopy.) *Stereochemistry.

X-ray crystallographic structure determinations were made of solids in which charge transfer bonds were established between different molecules (addition compounds) or between molecules of the same kind. New examples of halogen molecule bridges were found and the rule firmly established that the arrangement donor atom-halogen-halogen-donor atom is always at least nearly linear. Several addition compounds formed by organic halides (acceptor molecule) and varying donor molecules were also studied. In this case an arrangement donor atom-halogen-carbon is observed which is very nearly linear. Interest was focused on structures of crystals built up of a single molecular species that contains both electron accepting and electron donating atoms. It was found that charge transfer bonding occurs joining a particular molecule to the greatest possible number of nearest neighbours. The geometry of the arrangement conforms to the rules already established in the case of addition compounds. (Author)

AD-267 307 Div. 4
(TISTM/GEC) OTS price $1.60

United Technology Corp., Sunnyvale, Calif.
THERMOCHEMISTRY OF OXYGEN-FLUORINE BONDING.
Quarterly technical summary rept. no. 1 for period ending 30 June 61,
by R. Anderson and R. O. MacLaren. July 61, 13p. incl. illus.
(Contract Nonr-343300)
(ARPA Order no. 184-61)
Unclassified report

DESCRIPTORS: (Design of Laboratory equipment for Synthesis of *Oxygen compounds, *Fluorides, Fluorination, Dioxides, Nitrogen compounds.) (*Thermochemistry, Heat of formation, Physical properties, Mass spectroscopy, Infrared spectroscopy, Chromatographic analysis.) (Chemical bonds, Oxygen, Fluorine.) (Perchloryl radicals, Fluorides, Nitro radicals.) (Nitrogen compounds, Oxyfluorides.)

Effort was concentrated on design, fabrication, and procurement of experimental equipment requisite to synthesis of O - F compounds and compositional analysis of reaction products for thermochemical evaluation of synthesized materials. Reaction systems were constructed for synthesis and purification of NO2F, NO3F, and ClO4F. Synthesis of NO2F was accomplished directly from NO2 and F2. The synthesized material was analyzed for purity by infrared spectroscopy, mass spectroscopy, and by hydrolysis. The two latter techniques of analysis agree within one percent. (Author)

AD-267 432 Div. 4
(TISTM/GEC) OTS price $6.60

Royal Inst. of Tech. (Sweden).
RESEARCH ON CHARACTERISTICS OF TRANSITION ELEMENTS IN SOLUTION. 1. STUDIES ON RHODIUM CHEMISTRY. 2. STUDIES ON RUTHENIUM CHEMISTRY,
by Lars Gunnar Sillen, Clara Berecki-Biedermann, and Felipe Brito. 1961, 63p. incl. illus. tables, 13 refs. (Included in this rept. is Technical note no. 2, AD-245 504)
(Contract AF 61(052)181)
(AFCRL TN 60-676) Unclassified report

DESCRIPTORS: (*Ruthenium compounds, *Rhodium compounds, Perchlorates, Sulfates, Solutions, Ions, Synthesis, Chemical analysis, Chemical reactions, Spectrographic analysis, Hydrolysis, Solvent action.)

A method is described for the preparation of halogenide-free rhodium (III) perchlorate and sulfate solutions. For the analysis of total Rh, a method is proposed, based on reduction of the metal by passing H2 through the solution at 90 C. The filtrate can afterwards be conveniently analyzed for excess H +, for total anions by ion exchanger and for other constituents. Preliminary studies on the hydrolysis of rhodium (III) in perchlorate solutions at 25 C, by emf and spectrophotometric measurements, indicate that a single species predominates, probably with 1.75 ± 0.1 OH(-) bound per Rh atom. The experimental conditions were investigated for the quantitative oxidation of Rh(III) to Rh(V) by means of O3 in perchlorate and sulfate solution. Extinction curves for Rh(III) in perchlorate, sulfate and chloride solutions, and for Rh(V) in sulfate and perchlorate solutions are given. Ru(IV) sulfate or perchlorate solution and Ru(III) sulfate solution were prepared by reducing RuO4. A redox titration method is proposed suitable for determining total Ru in dilute solutions. (Author)

AD-267 467 Div. 4, 25
(TISTM/GEL) OTS price $1.10

Naval Civil Engineering Lab., Port Hueneme, Calif.
SEPARATION OF SATURATED HYDROCARBONS FROM

CREOSOTE-COAL TAR SOLUTIONS BY COLUMN CHROMATOGRAPHY,
by R. W. Drisko and H. Hochman. 11 Dec 61, 4p. incl. table (Rept. no. TN-425)
(Proj. Y-R005-07-007)
Unclassified report

DESCRIPTORS: (*Hydrocarbons, Separation from Creosote, Coal tar, Solutions, Petroleum, Chromatographic analysis, Laboratory equipment, Tests, Test methods.)

A chromatographic method of analyzing creosote for saturated hydrocarbons was described in AD-250 624. The present note describes a modification of this method for application to creosote-coal tar solutions. (Author)

AD-267 527 Div. 4, 25
(TIPTM/GEC) OTS price $1.00

Materials Central, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
THE INFRARED SPECTRA OF THE PHENYL COMPOUNDS OF GROUP IVb, Vb, AND VIIb ELEMENTS.
Rept. for Jan 59-July 60 on The Chemistry and Physics of Materials,
by L. A. Harrah, M. T. Ryan, and C. Tamborski. Dec 60, 30p. incl. illus. tables, 13 refs.
(Proj. 7360)
(WADD TR 60-759) Unclassified report

DESCRIPTORS: (*Phenyl radicals, Benzenes, Deuterated compounds, *Halocarbons, *Infrared spectroscopy, *Raman spectroscopy, Vibration, Spectrophotometers.) (*Metalorganic compounds, Silanes, Antimony compounds, Bismuth compounds, Lead compounds, Germanium compounds, Tin compounds.) Halides, Molecular spectroscopy.

The infrared spectra between 2 and 35 microns of a large number of phenyl compounds of group IVb, Vb, and VIIb elements are presented. The spectral features of interest in qualitative and quantitative analysis are discussed and empirical correlations between the spectra and properties of the central metal atom demonstrated. The spectra beyond 15 microns are shown to be particularly useful in the quantitative identification of this class of materials. (Author)

AD-267 598 Div. 4, 10
(TISTA/SEB) OTS price $1.10

Texaco Experiment Inc., Richmond, Va.
COMBUSTION OF ELEMENTAL BORON.
Quarterly summary rept., Aug-Oct 61,
by U. V. Henderson, Jr. and Harry P. Woods.
1 Nov 61, 9p. incl. illus. (Rept. no. TM-1296; EXP 223)
(Contract Nonr-188300)
Unclassified report

DESCRIPTORS: (*Boron, Combustion, Reaction kinetics, Chemical reactions with Oxidizers, Oxidation, Tests, Test methods, Test equipment.)

Equipment was constructed for carrying out experiments for the determination of the kinetics and the mechanism of the reaction of various oxidizers with elemental B. Kinetic experiments will be carried out with a quartz microbalance in a flow system operated at low pressures. Surface reaction mechanisms are being investigated by means of reactions carried out in situ with a B rod inside a mass spectrometer. Preliminary experiments indicate that BF is the species envolved from the B surface. (Author)

AD-267 621 Div. 4
(TISTM/GEC) OTS price $9.10

Texaco Experiment Inc., Richmond, Va.
KINETICS OF CONDENSATION FROM THE VAPOR PHASE.
Sumary rept. for period ending 15 July 61,
by Welby G. Courtney and Wendall J. Clark.
15 July 61, 96p. incl. illus. tables, 105 refs.
(Rept. no. TM-1250; EXP 328)
(Contract Nonr-314100)
Unclassified report

DESCRIPTORS: (Reaction kinetics, *Condensation and Nucleation, Molecules, Growth, Liquids, Vapors, *Phase studies, Thermodynamics, Theory, Mathematical analysis.)

A theoretical and experimental investigation was made of the kinetics and mechanisms of condensation and homogeneous nucleation from the vapor phase. A review is made of the non-steady-state theories of nucleation, the steady-state theories including the classical liquid-drop and the constant-number theories and, of growth and agglomeration during condensation. An error was noted in the thermodynamic basis of the classical liquid-drop theory of nucleation. A quasi-exact mathematical treatment of non-steady-state nucleation was developed and solved on a computer. A mathematical treatment of condensation via steady-state nucleation was developed. Results gave no indication of a critical supersaturation for condensation and showed that condensation via classical liquid-drop homogeneous nucleation would be much slower than that experimentally observed in cloud chambers. The classical liquid-drop theory of nucleation apparently remains to be verified. (Author)

AD-267 654 Div. 4
(TISTM/REB) OTS price $1.10

Naval Ordnance Lab., Corona, Calif.
PREPARATION OF DEUTERATED COLEMANITE,
by Charles R. Parkerson. Sep 61, 12p.
(Technical memo. no. 42-56)
Unclassified report

DESCRIPTORS: (*Calcium compounds, *Borates, *Deuterated compounds, Synthesis.) (Borax, Synthesis.) (Borax, Calcium compounds, Sulfates, Deuterated compounds, Synthesis.)

The preparation of deuterated colemanite was undertaken to provide sufficient material to allow a comparison of its ferroelectric properties with that of naturally occurring mineral colemanite and also with synthetic normal colemanite. The reactants, deuterated Borax ($Na_2B_4O_7.10D_2O$) and Meyerhofferite ($2CaO.3B_2O_7.7D_2O$) were prepared. Two reactions were performed to produce the colemanite. In the first reaction the Meyerhofferite and Borax were reacted with D_2O and normal colemanite seeds at 68 Cfor 56 days. Conversion to deuterated colemanite was complete. The second reaction was modified slightly by using fewer grams of the reactants in the same ratio as in the first reaction. After 88 days at 68C only about 50% conversion occurred.

AD-267 732 Div. 4
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
FREE RADICALS,

by V. I. Vedeneyev. 20 Nov 61, 14p. incl. illus. (Trans. no. FTD-TT-61-131 of Priroda 12:10-16, 1960)

Unclassified report

DESCRIPTORS: (*Free radicals, Theory, Chemical reactions, Chain reactions, Decomposition, Hydrocarbons, Polymers, Radiation effects, Nitro radicals, Atoms, Nitrogen, Hydrogen, Low temperature research.) (USSR, Translations, Technological intelligence.)

Free radicals are discussed in relation to (1) the mechanism of chemical reactions, (2) theory of chain processes and free radicals, (3) the method of metallic mirrors, and (4) frozen radical and their reactions.

AD-267 734 Div. 4, 25
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
X-RAY L-SPECTRA OF NIOBIUM IN NIOBIUM DIBORIDE, NITRIDE AND CARBIDE, AND THE NATURE OF THE BOND IN THESE COMPOUNDS,
by M. I. Korsunskiy and Ya. Ye. Genkin.
28 Aug 61, 8p. (Trans. no. MCL-1019 of Issledovaniya Po Zharoprochnym Splavam, Moskva 6:169-173, 1960)

Unclassified report

DESCRIPTORS: (*Niobium, Niobium compounds, Borides, Nitrides, Carbides, Chemical bonds, Phase transitions, Atomic orbitals, Atomic spectrum, Fluorescence, X-ray spectroscopy.) USSR, Translations, Technological intelligence.

The spectral lines of the fluorescent L-spectrum of Nb in the compounds NbN, NbC, NbB2 and in pure Nb were determined. The intensity and shape of the L sub alpha 1, L sub beta 1, L sub beta 3, and L sub beta 4 lines vary insignificantly, whereas the intensity and shape of the L sub beta 2 and L sub gamma 1 bands undergo sharp changes. The L sub beta 2 and L sub gamma 1 bands of Nb in the compounds proved to be only a portion of the corresponding bands of pure Nb. The truncation of portions of the bands is a consequence of the fact that a portion of the electrons leaves the d-orbits. In the formation of niobium nitride, carbide, and diboride, 4d-electrons leave the Nb atom to go into the linkage. (Author)

AD-267 764 Div. 4
(TISTP/JDP) OTS price $1.60

Textile Research Inst., Princeton, N. J.
MOLECULAR DIMENSIONS IN CRYSTALLINE POLYMERS,
by A. V. Tobolsky and V. D. Gupta. Oct 61, 9p. (Technical rept. no. 25)
(Contracts Nonr-09000 and Nonr-09001)

Unclassified report

DESCRIPTORS: (*Polymers, Crystal structure, *Molecular structure, Statistical analysis, Probability, Matrix algebra.)

From theoretical considerations the molecular dimensions of polymer chains in partially crystalline polymers existing in any state of orientation are calculated. The theory also applies to isolated molecules in solution which have helical and random coil regions within the same molecule. The treatment is based on two probability parameters and the mathematical method of the Markoff chain. (Author)

AD-267 795 Div. 4
(TISTM/TCG) OTS price $1.60

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
CONJUGATION, HYBRIDIZATION, AND STERIC HINDRANCE IN RELATION TO BOND LENGTHS,
by E. Bright Wilson, Jr. 1961, 18p. incl. tables, 46 refs.
(Sponsored by the Office of Naval Research)

Unclassified report

DESCRIPTORS: (*Chemical bonds, Aliphatic compounds, Methyl radicals, Formates, Ethylenes, Chlorides, Fluorides, *Stereochemistry, Microwave spectroscopy, Atomic orbitals, Theory.)

Three theories which have been proposed to explain the observed shortening of a single bond when it is adjacent to a double bond are discussed. Possible predictions from these theories are examined, especially for comparison with various quantities measurable by microwave spectroscopy. It is concluded that the steric theory is probably untenable, that some conjugation appears necessary to explain observed barriers to internal rotation, and that it is difficult to find testable predictions from the hybridization theory. (Author)

AD-267 820 Div. 4
(TISTM/GEC) OTS price $1.60

Olin Mathieson Chemical Corp., New Haven, Conn.
BORON POLYMERS,
Quarterly progress rept. no. 2, 11 Aug-10 Nov 61, by T. L. Heying. 1 Dec 61, 16p. (Technical rept. no. 4)
(Contract Nonr-339500)

Unclassified report

DESCRIPTORS: (*Polymers, *Heat resistant polymers, *Boron compounds, Synthesis, Borines, Phenyl radicals, Nitriles, Pentaboranes, Decaboranes, Phosphines, Chemical reactions.) (Hydrolysis, Crystallization, Chemical bonds, Chemical analysis, Determination, Carbon, Hydrogen, Boron.)

Pentaborane did not react with acetylenic compounds under various conditions employed. Acetonitrile and pyridine reacted with pentaborane to form adducts ($B_5H_9 \cdot 5CH_3CN$). Investigations of the preparation of nuclear substituted perhydrodecaborate salts indicated that such compounds can be prepared; $(CH_3NH)_2B_{10}H_9Br$ and $(Ph_3P)_2B_{10}H_{11}Br$ were prepared. The chemistry of $ClPh_2B_{10}H_{12}Ph_2PCl$ was further explored and many nucleophilic substitutions for the Cl atoms were made. The yields of substituted products were well above 90%. Polymerizations involving some of these derivatives were effected. For example, heating $HOPPh_2B_{10}H_{12}Ph_2POH$ gave a very stable polymer believed to have the structure $(-OPPh_2B_{10}H_{12}Ph_2P-)$. Polymers were achieved via the direct reaction of diphosphines with decaborane. $Ph_2PB_{10}H_{13}$ was shown to possess acid character. (Author)

AD-267 911 Div. 4
(TISTM/GEC) OTS price $3.60

Applied Science Labs., Inc., State College, Pa.
RESEARCH STUDY OF PHYSICOCHEMICAL TECHNIQUES

FOR THE PURIFICATION OF ORGANIC COMPOUNDS.
Final rept., 1 June 58-1 Dec 61,
by Robert F. Sweeny and Arthur Rose. 6 Dec 61,
35p. incl. illus. tables, 11 refs.
(Contract DA 18-108-405-cml-176)
Unclassified report

DESCRIPTORS: (*Organic compounds, *Organic solvents, *Films, Membranes, *Purification by Diffusion, Polarization.) (Polymers, Solutions, Hexanes, Ethanols, Acetones, Chloroform.) (Films, Ethylenes, Vinyl chlorides, Vinyl radicals, Cellulose acetates, Propenes, Ethyl cellulose, Cellulose.) Separation, Semipermeability.

The process of membrane permeation was investigated to determine separation and rate characteristics of various films permeated by n-hexane, acetone, chloroform, and ethanol, and various binaries made up of these chemicals. The characteristics were related to the chemical nature of permeants and films. Combinations of the binaries with chemically different films were studied for separation. Cases of extremely high separations were discovered and two rules for separation behaviour were developed: (1) binaries of those components which vary more in polarity are generally more easily separated; and (2) the component of polarity more like that of the film is preferentially permeated. The concept of rate factors used to correlate the rates of pure solvents with polarity of films and permeants. Rates as high as 2000 g/hr-sq m were not uncommon. Studies were made of the rates for several high molecular weight substances through various commercial films. Instances of significant permeation were discovered. (Author)

AD-267 916 Div. 4, 25
(TISTM/GEC) OTS price $1.10

Army Engineer Research and Development Labs., Fort Belvoir, Va.
DIFFUSION THROUGH ION EXCHANGE MEMBRANES AND THEIR ELECTROCHEMICAL CHARACTERISTICS
(Diffuziya Cherez Ionoobmennyye Membrany i Ikh Elektrokhimicheskaya Kharakteristika)
by Ya. M. Kots and V. A. Zarinskiy, tr.
by L. G. Robbins. Dec 1961, 2p. incl. table.
(Trans. no. T-1252 of Zhurnal Fizicheskoy Khimii.) (Jnl. of Physical Chemistry)35:1103-1104, 1961)
Unclassified report

DESCRIPTORS: (Diffusion, *Ion exchange, Membranes, Electrodialysis, *Electrochemistry, Electrolytes, Solutions, Resistance, Conductivity.) (Technological intelligence, *Translations, USSR.)

An investigation of the dependence between ion diffusion through ion-exchange membranes, the number of ions transported through them, and the specific electrical resistance of the membranes is reported. (Author)

AD-267 924 Div. 4, 10
(TISTA/SEB) OTS price $1.10

Science and Tech. Branch, Aerospace Information Div., Washington, D. C.
INDIVIDUAL CYCLIC HYDROCARBONS AS PROSPECTIVE JET FUELS.
29 Nov 61, 2p. (AID Rept. 61-159; Trans. of Lithium-Organic Synthesis and Study of the Properties of some Alpha-Alkylnaphthalenes C18-C20. Izvestiya Vysshikh Uchebnykh Zavedeniy. Khimiya I Khimicheskaya Tekhnologiya 4:617-620, 1961)
Unclassified report

DESCRIPTORS: (Alkyl radicals on Hydrocarbons, *Naphthelenes, Synthesis, Hydrogenation, Chemical analysis, Physical properties, Chemical properties.) (*Jet engine fuels, Additives.) (Translations, Technological intelligence, USSR.)

The article illustrates Soviet interest in the synthesis and properties of individual C18-C20 hydrocarbons of the naphthalene and decalin series, used as additives to lubricating oils, materials for the production of surface-active agents, and components of liquid fuels for aircraft engines. The branched-chain derivatives are of special interest in this last case because of their low freezing point, high boiling point, and high heat of combustion per unit volume. Since the freezing points of the hydrocarbons obtained were the subject of attention, the study reported may be related to attempts to produce a quality jet fuel. However, the low yields mentioned indicate that any such efforts are still in the experimental stage. (Author)

AD-267 972 Div. 4
(TISTM/EJH) OTS price $2.60

Rome U. (Italy).
IONIC MOBILITY AND RECOMBINATION IN LIQUID HELIUM II.
Final technical rept. 1 Nov 60-31 Oct 61.
31 Oct 61, 18p. incl. table.
(Contract DA 91-591-EUC-1609)
Unclassified report

DESCRIPTORS: (*Ions, *Helium, *Liquefied gases, Rotation, Recombination reactions, Low temperature research, Cryogenics, Pressure, Electric fields, Electric currents, Theory, Test methods.)

The research performed may be divided into 2 general categories: investigation of the properties of ions in liquid He, and the use of He ions in experiments on the rotation of liquid He. All the work was carried out at temperatures in the He II region, that is below 2.19 K. Experiments included the following: (1) the electric field dependence at high temperature; (2) the electric field dependence at low temperature; and (3) the pressure effect on the mobility. The current of a beam of negative ions in rotating He suffered a strongly anisotropic attenuation. These effects can be interpreted in terms of the Feynman array of vertical lines, where the ions are captured. (Author)

AD-267 976 Div. 4
(TISTM/EJH) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THE ELECTROLYTIC POLARIZATION OF BERYLLIUM.
Technical rept. on Materials and Chemistry,
by D. J. Levy. Nov 61, 22p. incl. illus. tables,
10 refs. (Rept. no. LMSC-6-90-61-75)
Unclassified report

DESCRIPTORS: (*Polarization of *Beryllium, Electrodes, Solutions, Salts, Electrolytes, Ions, Chromates, Phosphates, Halides, Films, Beryllium compounds, Oxides.) (Electrochemistry, Corrosion.) Surface properties.

The anodic and cathodic polarization behavior of Be was determined in a number of unstirred aqueous electrolytes at 22 C with current densities in the range of 10 to the -7th power to 10 to the -2nd power amps/per square centimeter. CrO4 and PO4 ions induced considerable anodic polarization. There was some evidence that the anodic potential was increased due to BeO film formation in the presence of CrO4, NO3, and AlO2 ions. A Flade Potential was not observed. Be was activated and attacked anodically in the presence of Cl, ClO3, F and SO4 ions. Other ions investigated were B4O7, C2H3O2, CO3, MnO4, OH, and SiO3. Na2CrO4 was an effective cathodic polarizer over a broad range of current densities. Most of the electrolytes exhibited a common Tafel region for hydrogen evolution. Some corrosion aspects of the solutions are also discussed. (Author)

AD-267 991 Div. 4
(TISTM/TCG) OTS price $1.10

Olin Mathieson Chemical Corp., New Haven, Conn.
DIPHENYLPHOSPHINODECABORANE AND DIPHENYLPHOSPHINONABORANE,
by Hansjuergen Schroeder. 11 Dec 61, 3p.
10 refs. (Technical rept. no. 5)
(Contract Nonr-339500, Proj. NR 356-431)
Unclassified report

DESCRIPTORS: (*Decaboranes, *Phosphinoborines, Phosphorus compounds, Phenyl radicals, Synthesis, Physical properties, Molecular structure, Infrared spectroscopy, Chemical bonds.) (*Boron compounds, Chemical reactions, Phosphines, Chlorides.) (Alcohols, Amines.)

An investigation was made to synthesize phosphinodecaboranes (R2P-B10H13) with trivalent phosphorus and to study their properties. Decaborane was treated with diphenylphosphine, diphenylchlorophosphine and ethyl diphenylphosphinite. Substitution involving the elimination of H, HCl or EtOH, respectively, did not occur, rather the corresponding B10H12(Ph2P,R)2 compounds were obtained (I, where R was H, m p 244 C; II where R was Cl, m p 212 C; III, where R was OEt, m p 216 C). Compound II was the subject of a comprehensive study of nucleophilic chlorine substitution, also the ligands of II and III were proved to be attached at the 6, 9 positions of the decaborane nucleus. (Author)

5. COMMUNICATIONS

AD-267 157 Div. 5
(TISTE/CDM) OTS price $8.60

National Cash Register Co., Dayton, Ohio.
HIGH FREQUENCY DIGITAL COMMUNICATION SYSTEM.
Quarterly engineering rept. no. 1.
31 Aug 61, 95p. incl. illus. tables (NCR rept. no. 3-1Q)
(Contract AF 33(600)42197)
Unclassified report

DESCRIPTORS: (Communication systems, *Digital systems, Data transmission systems, Very low frequency, Design, Production, Reliability.) (Digital computers, Airborne, Electronic circuits, Computer logic, Ground support equipment, Tests, Test equipment.) (*Radio communication systems, Frequency modulation, *Aircraft equipment.) Frequency shift keyers.

Research concerns the development of a high frequency digital communication system. Consideration was given to the design, fabrication, reliability testing, and maintenance of airborne and ground station digital equipment which will operate with other data systems utilizing standardized message format parameters. Spare parts, engineering data, test equipment, and reports are to be included in the over-all program. Major effort concerned analyzing the system and designing those circuits and items not dependent on the modulation method. The basic logic elements, a flip-flop circuit and a NOR circuit, were designed, breadboarded into logic format, and tested. Several decision circuits were completed. Packaging of circuits was determined. A mock-up of the airborne converter chassis was put through environmental tests. An extensive discussion of the development and testing of the ground station components is included. (Author)

AD-267 219 Div. 5, 8
(TISTE/CDM) OTS price $3.60

Emertron, Inc., Silver Spring, Md.
SCATTERING OF ELECTROMAGNETIC WAVES BY ULTRASONIC BEAMS.
Quarterly progress rept. no. 1, 15 June-15 Sep 61.
15 Sep 61, 30p. incl. illus. (QPR-1-5514)
(Contract DA 36-039-sc-87236, Proj. 3A99-20-001)
Unclassified report

DESCRIPTORS: (*Electromagnetic waves, *Radio waves, Radio signals, Scattering by *Ultrasonic radiation, Theory, *Wave transmission.) (Vibration, Ultrasonics, Tests, Test equipment.) (*Microwave communication systems, Radio waves.) (Atmospheric refraction, Refractive index, Reflection.)

Efforts were made to determine the feasibility of non-line-of-sight microwave communication systems, using ultrasonic scattering transmission. Factors affecting the scattering of radio waves by sonic beams are discussed from the point of existing theory. Among the significant factors are: changes in the refractive index of air, the angles of incidence and of reflection of a radio beam relative to a sonic beam, the collimation or half power beamwidth of the sonic beam, and distortion of a plane or spherical sonic wave caused by various meteorological phenomena. A review of sonic sources is presented with the theory of the forced air vibrator type of source expanded. In essence, it combines the advantages of the siren with those of the mechanical vibrator, and hence was selected for this study. The experimental tests and evaluation of a prototype forced air vibrator were initiated and serve as the basis for out-of-doors experiments aimed at measuring quantitatively the scattering of a radio beam in the 30-34 kmc region by an ultrasonic beam in the 10-12 kc region. (Author)

AD-267 536 Div. 5
(TISTE/CRJ) OTS price $3.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
THE DICON SYSTEM,

by R. S. Berg, D. B. Eshleman and others.
31 Oct 61, 28p. incl. illus. (Technical rept. no. 251)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: (*Radio communication systems, Digital systems, Data transmission systems, Doppler systems, *Multipath transmission, X band, *Frequency shift keyers, Pulse communication systems, Teletype systems.) (Radio communication systems, Radio receivers, Radio transmitters, Magnetic tape, Magnetic recording systems.) Perturbation theory, Space environmental conditions.

Built to demonstrate the applicability of the Project West Ford channel as a high capacity digital data link, the DICON system comprises a transmitter which provides a variety of modulation signals to the West Ford RF transmitter and a receiver designed to recover the modulation signal from the output of the West Ford X-band receiving system and to measure and record the perturbations introduced by the West Ford channel. These perturbations are expected to be due principally to Doppler shift, Doppler spread and multipath delay. Since the fluctuation and multipath times may be of the same order, a noncoherent detection scheme is used. (Author)

AD-267 594 Div. 5, 8
(TISTP/MFA) OTS price $2.60

Cook Research Labs., Morton Grove, Ill.
INVESTIGATION OF PULSE INTERFERENCE CONTROL VIA SOLID STATE DEVICES.
Interim engineering rept. no. 1, 15 Mar-15 June 61,
by I. N. Mindel. 15 June 61, 20p. incl. illus. 25 refs.
(Contract AF 33(616)8128)
Unclassified report

DESCRIPTORS: (*Solid state physics, *Semiconductors, Diodes, *Electronic equipment, Electronic systems, Pulse integration, Tests, Analysis.) (Instrumentation, Pulse amplifiers, Oscillators, Crystal detectors, Switching circuits.) (Experimental data, Research program administration.) Tables, *Bibliography.

An applied research effort to determine the feasibility of utilizing semiconductors for pulse interference control in the frequency range of 2 mc to 10 mc is presented. (Author)

AD-267 934 Div. 5, 8, 30
(TISTE/NTM) OTS price $2.60

Bendix Systems Div., Bendix Corp., Ann Arbor, Mich.
ANTENNA WINDOW: A TECHNIQUE FOR PROPAGATION THROUGH A PLASMA SHEATH.
Interim engineering rept. no. 2, 1 Sep-1 Dec 61,
by R. DeLosh, C. LaPointe and others. 1 Dec 61, 26p. incl. illus. (Rept. no. BSR-620)
(Contract AF 33(616)8420)
Unclassified report

DESCRIPTORS: (*Pulse communication systems, Design.) (*Plasma physics, *Magnetic fields, *Microwave probes, Tuning devices, Polarization, X band, Crystals, Measurement.) (*Shock tubes, Electrons, Density, Ionization, Doppler radar, Shock, Velocity.) (*Research test vehicles, Aerodynamics, Re-entry aerodynamics, Communication systems.)

Several aerodynamic analyses were performed for the Trailblazer II vehicle. These are: (1) calculation of stagnation point electron density and collision frequency for an 80 degree launch, 20-lb payload vehicle; (2) study of plasma layer thickness at the stagnation point; and (3) determination of the effect of a magnetic field on the plasma layer thickness. The shock tube was improved to obtain higher shock wave velocities and hence, higher electron densities; several refinements were made on the microwave plasma diagnostic devices; and provision was made for accurately controlling the initial shock tube conditions. Preliminary measurements made of the magnetic window effect indicated that a magnetic field can reduce microwave attenuation to a negligible value. (Author)

AD-268 010 Div. 5, 8
(TISTE/CRJ) OTS price $1.10

Centro Radioelettrico Sperimentale G. Marconi (Italy).
RADIOCOMMUNICATION BY BACKSCATTER.
Annual summary rept. no. 2, 1 Dec 59-31 May 61,
by Ivo Ranzi. 30 June 61, 2p.
(Contract AF 61(052)139)
(AFCRL-913) Unclassified report

DESCRIPTORS: (*Radio communication systems, High frequency, *Radio waves, Scattering, Polarization, *Radio transmission, Intensity.) (Beaches, Oceans, Terrain, Ocean waves.) (Ionospheric disturbances, Ionospheric propagation.) Solar eclipse, Italy.

Contents:
Direct backscatter from sea and from coast
Backscatter sounding during the solar eclipse of February 15, 1961
Backscatter sounding during ionospheric storms

AD-268 054 Div. 5, 8
(TISTE/CDM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
IMPORTANT PROBLEMS OF RADIO ENGINEERING (Vazhlivi Problemi Radiotekhniki),
by I. V. Akalovskiy. 1 Dec 61, 8p. incl. illus. (Trans. no. MCL-980 of Nauka i Zhittya, No. 1:19-21, Jan 1961)
Unclassified report

DESCRIPTORS: (USSR, Technological intelligence, Translations.) (*Radio, *Radio fields, Ultra high frequency, Information theory, *Radio communication systems, Radiochemistry.)

A brief survey of the progress of Russian radio engineering is presented, followed by an enumeration of some modern applications for radio. Special mention is made of ultra high frequency for radio communications and for conductorless transmission of energy. Radiochemistry, information theory, and medical applications of radio are briefly discussed.

AD-268 069 Div. 5
(TISTE/CRJ) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR AUTOMATIC DETERMINATION OF THE FUNDAMENTAL TONE FREQUENCY,
by A. A. Pirogov. 29 Nov 61, 3p. incl. illus. (Trans. no. FTD-TT-61-206 of Byulleten' Izobreteniy No. 13, Patent no. 129739:38-39, 1960)
Unclassified report

DESCRIPTORS: (*Speech representation, Speech, Coding, Instrumentation, Automatic, Correlation techniques.) (Translations, USSR, Technological intelligence.) (Modulators, Delay lines, Electronic circuits, Commutators.)

The proposed device for automatic determination of the fundamental tone frequency has the distinquishing feature that, to produce more defined maximum pulses corresponding to maximum correlation functions, it contains balanced modulators for voltage multiplication. The first inputs of these modulators are connected to the delay line taps. The outputs of the modulators are connected, by means of accumulators (filters) and a commutator, to the output device. This is a binary counter or a trigger for producing pulses which are width-modulated in proportion to the period of the fundamental tone frequency. (Author)

6. DETECTION

AD-267 178 Div. 6, 12
(TIPTA/WAW) OTS price $5.60

Air Force Cambridge Research Labs., Bedford, Mass.
THE BACKSCATTER CROSS SECTIONS OF A FAMILY OF DARTS,
by Benjamin B. Gorr and Richard B. Mack. Apr 61, 51p. incl. illus. (Rept. no. AFCRL 373)
(Proj. no. 5635)
Unclassified report

DESCRIPTORS: (Radar targets, *Satellite vehicles, *Radar echo areas, Radar reflections, Polarization, Measurement.)

The monostatic backscatter cross sections of a family of darts having fin angles of 45, 30, and 15 degrees, and fin widths of 0.6, 1.9, 5.75, 6.0, and 19 cm, were experimentally determined at frequencies of 9302.4 and 3100.8 Mcps at climb angles of 0, 45, and 90 degrees. Measurements obtained with a cw balanced magic tee system are shown in patterns taken at both horizontal and vertical polarizations. (Author)

AD-267 323 Div. 6, 25
(TISTW/RD) OTS price $3.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THE THRESHOLD SENSITIVITY LIMITS OF THERMAL INFRARED DETECTORS.
Technical rept., on Physical Electronics,
by Leo Davis. Oct 61, 32p. incl. illus. (Rept. no. 6-90-61-78)
Unclassified report

DESCRIPTORS: (*Infrared detectors, Sensitivity, Lead compounds, Sulfides, Tellurides, Infrared radiation, Bolometers, Thin films, Signal-to-noise ratio.) Infrared detectors, Thermodynamics.

The limitations of thermal or heat detectors are examined. The mechanism of detector response and its relationship to the detector's heat coupling with the environment is given special emphasis, as is also the inherent or thermodynamic fluctuations of the detector. The practical realizability of optimum detector operation is analyzed and two configurations are shown which make it feasible. Finally, a possible detector scheme is proposed which may achieve the inherent detector performance limits. (Author)

AD-267 334 Div. 6, 12, 8, 30
(TISTA/VGW) OTS price $2.60

Aeronutronic, Newport Beach, Calif.
CONTINUING SERVICES TO THE 496L ESSPO SYSTEM ANALYSIS AND INTEGRATION. PROGRAMMING, ORBIT DETERMINATION AND MAINTENANCE.
Final rept.
Nov 61, 21p. (Publication no. U-1467)
(Contract AF 19(604)7375)
Unclassified report

DESCRIPTORS: (*Combat information centers, Digital computers, Data processing systems, Data storage systems, Automation, Programming, *Satellite vehicle trajectories, *Orbital flight paths, Detection, Determination, Mathematical prediction.) (Early warning radar, Search radar, Radar scanning, Radar tracking, Satellite vehicles, Artificial planetoids, Flight paths.)

A brief over-all view of the major work areas and performance in each of them is presented with references to those documents which have been produced during the course of this contract which fully describe achievements in the orbit determination areas, design considerations for the Space Detection and Tracking Systems (SPADATS) Center System, and details of the program and operating system. (Author)

AD-267 410 Div. 6, 25
TISTW/RD) OTS price $1.25

Electro-Optical Systems, Inc., Pasadena, Calif.
A SOURCE AND DETECTOR OF RADIATION IN THE WAVELENGTH REGION 1500-50 ANGSTROMS SUITABLE FOR RADIATION EFFECTS STUDIES ON MATERIALS IN VACUO.
Rept., 1 May 59-30 June 60 on The Chemistry and Physics of Materials,
by Horace R. Moore. July 61, 41p. incl. illus. tables, 55 refs.
(Contract AF 33(616)6488, Proj. 7360)
(WADD TR 60-371) Unclassified report

DESCRIPTORS: (*Ultraviolet radiation, Detection, Sources, Absorption, Vacuum systems.) (Cathodes, Photoemission, Phototubes, Photomultipliers.) (*Ultraviolet detectors, Design, Phototubes, Luminescence, Ionization chambers, Calibration.) Plasma physics, Capacitors, Discharge tubes, Photographic plates, Bremstrahlung.

A source and detector of vacuum ultraviolet radiation in the wavelength range 1500 - 50 angstroms are described; they are being developed for radiation effects studies on materials in vacuo. The principle of the radiation source is

the repetitive pulsed discharge of capacitor stored energy into a ceramic discharge tube. A very hot plasma will thus be generated which will emit vacuum ultraviolet radiation by Bremsstrahlung - like processes. The principle of the radiation detector is photoelectric emission from a photocathode exposed directly to the radiation in vacuo. The pulsed output current from the multiplier phototube will be measured with a finite integrator. The radiation source and detector are designed to be finally incorporated in an environmental test chamber capable of being evacuated to a working pressure of 10 to the 9th power mm Hg. (Author)

AD-267 532 Div. 6, 5
(TISTE/NTM) OTS price $5.60

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A POLARIZATION-DIVERSITY SIMULTANEOUS-LOBING ANGLE-TRACKING RECEIVER,
by W. B. Renhult. 31 Aug 61, 49p. incl. illus.
(Rept. no. 42G-0002)
(Contract NAS1-229)
Unclassified report

DESCRIPTORS: (Space capsules, *Tracking, Radio communication systems.) (Radio receivers, Diversity reception, Phase shifters, Multipath transmission, Signal-to-noise ratio, Polarization.)

A simultaneous-lobing angle-tracking receiver is described, operating in the 225-260 mc telemetry band and employing polarization diversity. Its operation is considered primarily in the context of the Mercury range and tracking of the Mercury capsule. Several methods of providing diversity are briefly considered, and ways of implementing the phase shifts required at one polarization for coherent signal addition are discussed. A prototype receiver is briefly described although circuity which may be somewhat novel is covered in greater detail. No attempt was made to include all of the sophistication one might expect in such a receiver; circuits were simplified in some areas where, for example, a manual control can replace an automatic function and reduce complexity. Some conclusions are drawn as to how this receiver might perform in the Mercury environment. (Author)

AD-267 542 Div. 6, 25
(TISTW/RD) OTS price $5.60

Stanford Research Inst., Menlo Park, Calif.
PREDICTION OF FAR FIELD PERFORMANCE OF SONAR PROJECTORS FROM NEAR FIELD MEASUREMENTS.
Final rept.,
by A. Picker, E. M. Spurlock and others. Nov 61, 49p. incl. illus. tables, 14 refs.
(Contract Nonr-304900)
Unclassified report

DESCRIPTORS: (*Sonar projectors, Calibration, Water tanks in Transducers, Hydrophones.) (Sound, Absorption, Measurement, Acoustics, Water tanks.) (*Underwater sound transmission, Echo ranging, Accelerometers, Measurement.) *Anechoic chambers, Design.

Large sonar transducers often must be calibrated under conditions in which only the near radiation field is accessible, but it is desirable to predict far field performance of such transducers on a basis of near field measurements. Analytical solutions of the radiation pattern from a cylindrical transducer were undertaken, and it appears that further work could lead to a complete solution. The Stanford Underwater Measurement Pool (STUMP) facility was developed and experimental work was carried out with the objective of reducing reverberation in the tank to produce free near-field conditions. Impedance tube theory and technique were reviewed, and the tube was used to obtain preliminary information on selected absorbent materials for use in the tank. An average reverberation time of 167 msec was measured in the bare tank and compared with the reverberation times with selected absorber configurations. An accelerometer provided a potentially useful method of determining transducer response characteristics. A total acoustic power method of transducer calibration was developed which appears to be a very promising method for calibration of low-frequency projectors under reverberant conditions in the near field region. (Author)

AD-267 685 Div. 6, 23
(TISTW/RD) OTS price $14.00

Servo Corp. of America, Hicksville, N. Y.
APPLICATION OF INFRARED TECHNIQUES TO MILITARY TRAINING. PHASE II. A CONSIDERATION OF SPECIFIC MILITARY TRAINING APPLICATIONS,
by Irving Meltzer, Harry Breindel and others.
Aug 61, 193p. incl. illus. tables, 27 refs.
(Contract Nonr-61339)
(NAVTRADEVCEN TR 759-2) Unclassified report

DESCRIPTORS: (*Military training, Training devices, *Infrared equipment.) (Infrared radiation, Night sky, Sources.) (Infrared optical materials, Lenses, Mirrors.) (Infrared images, Infrared scanning.) (Phototubes, Photoemission.) (Infrared image tubes, Image intensifiers (Electronics).) (Optical materials, Optical systems, Iconoscopes.) (Training, Instructors, Students, Learning, Television display systems.)

An engineering analysis and feasibility investigation is presented of infrared techniques applied to military training problems. The investigation includes engineering considerations of infrared techniques applied to two specific training areas: night viewing based on the detection and conversion of infrared radiation into visible images, and interpretation of infrared displays by synthetic generation of infrared images. Preliminary designs for a combination near IR-TV and low-light-level TV and for a ground based optical mechanical scanner are presented as aids to further investigations. A bibliography on infrared imaging, television, simulation and image interpretation is included. (Author)

AD-267 719 Div. 6, 8, 30
(TISTW/RD) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AUTOMATION AND REMOTE CONTROL (SELECTED ARTICLES).
13 Nov 61, 30p. incl. illus. (Trans. no. FTD-TT-61-152 of Avtomatika i Telemekhanika 22:1027-1037, 1080-1087, 1961)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Automation, *Remote control systems.) (*Telemeter systems, Analog systems.)

Contents:
The selection of parameters for the control part of a gradient system of automatic optimization
The problem of digital reproduction of signals of analogue telemetering systems

AD-267 725 Div. 6
(TISTW/RD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A LIGHT RANGE FINDER WITH A SERVOSYSTEM AND AN INTEGRATING FREQUENCY METER,
by V. F. Khomaza and V. P. Vasil'yev. 20 Nov 61, 4p. incl. illus. (Trans. no. FTD-TT-61-214 of Byulleten' Izobreteniy, Patent no. 133611, No. 22:38-40, 1960)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) *Range finding, Optical equipment, *Servo systems, Frequency meters, Light, Modulation.

A light range finder is described with a servosystem and an integrating frequency meter with synchronous demodulation of the luminous flux and with a photoelectric receiver. The servosystem is used to automatically set a light modulation frequency corresponding to the minimum value of the luminous flux traversing the demodulator, and a computer is used to measure the light modulation frequency. (Author)

AD-267 846 Div. 6
(TISTE/CRJ) OTS price $6.60

Research Inst., U. of Michigan, Ann Arbor.
REMOTELY-CONTROLLED TACTICAL DIRECTION-FINDING SYSTEM,
by E. M. Aupperle, T. W. Butler, Jr. and D. L. Mills. July 61, 62p. incl. illus. tables. (Technical rept. no. 124; 2899-58-T)
(Contract DA 36-039-sc-78283, Proj. 3A99-06-001-01)
Unclassified report

DESCRIPTORS: (Armies, *Direction finding, *Radio receivers, Tuning devices, Remote control systems, Electronic circuits, Oscillator circuits, Design.) (Telemeter systems, Antennas, Display systems, Data transmission systems.)

A summary is presented of the work leading to the conception, design, and development of a receiver system employing solid-state tuning for use in a remotely-controlled direction-finding application. The cardinal features of the system are: (1) the elimination of the man at remote stations, (2) accurate station identification, (3) short acquisition times, and (4) good system-wide frequency stability. Included is a detailed description of the basic receiver and supporting telemetry and antenna subsystems. (Author)

AD-267 855 Div. 6, 30
(TISTE/CDM) OTS price $4.60

Space Technology Labs., Inc., Los Angeles, Calif.
ADVANCED TELEMETRY SYSTEM DEVELOPMENT.
Semiannual rept. 1 Jan-30 June 60,
by A. Egger. 30 June 60, 38p. incl. illus. tables (Rept. no. STL/TR-60-0000-09192)
(Contract AF 04(647)309)
(AFBMD TR 60-136) Unclassified report

DESCRIPTORS: (*Telemeter systems, Design, Communication systems, Space probes, Satellite vehicles, Analog-to-digital converters, Computer logic, Magnetic cores, *Electronic circuits, Switching circuits, Oscillator circuits, *Data processing systems.)

Progress in advanced telemetry system development is described. Discussions are included of studies leading to the specification for design characteristics of adaptive and analytical telemetry systems in which the information efficiently utilizes the data channel capacity. Also discussed are studies of advanced circuit applications and the use of magnetic cores in a variety of circuit refinements. A summary of signal characteristic studies is given. The areas of research, and the approach to a philosophy of design simplification for telemetry systems which is capable of adaptation to the wide spectrum of signal characteristic requirements continue to be pursued. The planned ultimate result is the establishment of specifications for such systems. Progress indicates that further sophistication of existing designs in telemetry will be less advantageous than the development of new systems of greater efficiency and adaptability for use beyond today's space horizons. (Author)

AD-267 875 Div. 6, 5, 8
(TISTE/CDM) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
THE DEEP DIP ELECTROMAGNETIC DETECTOR,
by A. Silverstein. 1 June 61, 31p. incl. illus. (Rept. no. NOLTR 61-7)
Unclassified report

DESCRIPTORS: (*Loop antennas, *Magnetic detectors, *Underwater equipment, Underwater sound, Marine biological noise, Noise, Tests.) (*Magnetometers, Helium, Underwater, Recording devices, Design.) (Antennas, Extremely low frequency, Measurement, Sensitivity.) (Detectors, Electromagnetic properties, Very low frequency, *Acoustic detectors, Underwater communication systems.)

A detailed description is given of the basic techniques which were developed to design a very sensitive underwater magnetometer. A very sensitive magnetic loop detector was designed and built, useful from about 5 to 10,000 c at any ocean depth. The theory and some results are given. A comparison is made of the loop and magnetic rod antennas. The helium magnetometer is discussed for undersea use. (Author)

AD-267 883 Div. 6
(TISTE/CRJ) OTS price $14.00

Radio Corp. of America, Moorestown, N. J.
RADAR PARAMETER MEASUREMENT PROGRAM FOR THEORETICAL AND EXPERIMENTAL RESEARCH LEADING TO THE

IMPROVEMENT OF RADAR SET AN/FPS-16.
Final rept.,
by R. W. Davis, R. L. Dube and others. Oct 61, 1v. incl. illus. tables.
(Contract DA 36-039-sc-78311)
Unclassified report

DESCRIPTORS: (*Radar tracking, Search radar, C band, X band, Calibration, Tests, Test facilities, Instrumentation.) (Radar equipment, Parametric amplifiers, Radar antennas, Radiometers, Radar receivers, Radar transmitters, Design.) (Atmosphere, Wave transmission, Radar signals, Propagation.)

Techniques and findings are presented of experimental and theoretical research, leading to the improvement of the AN/FPS-16 series of instrumentation tracking radars. Included are studies and measurements on antenna gain, signal strength calibration and stability, pedestal thermal stability, receiver characteristics (equivalent noise bandwidth and noise figure), transmitter power output and plumbing loss, field intensity, cross-section and scintillation, scintillation tracking noise, angle tracking errors due to thermal noise, solar tracking, atmospheric attenuation, star observations, and multipath propagation errors. Detailed coverage is given to the design, development, and evaluation of C-band parametric amplifiers, radar lock-on probability experiments, radiometer measurements, and studies of range tracking precision. Recommendations are presented for improvements of specific subsystems and operating maintenance procedures. (Author)

AD-267 941 Div. 6, 8, 12
(TISTE/NTM) OTS price $3.60

Paris U. (France).
AUTOMATIC RECORDING OF THE DOPPLER-FIZEAU EFFECT, OF THE AMPLITUDE AND DETAIL OF THE SIGNALS TRANSMITTED BY THE ARTIFICIAL SATELLITES.
Technical summary rept. no. 1, 1 Oct 58-30 June 61,
by Etienne J. Vassy. 30 June 61, 27p. incl. illus.
(Contract AF 61(052)155)
(AFCRL-926) Unclassified report

DESCRIPTORS: (*Satellite vehicles, *Doppler systems, Doppler tracking, Measurement, Amplitude modulation, Frequency modulation, High frequency, Remote control systems, Automatic, Antennas, Recording systems.)

Description of the equipment permitting the listening of the artificial satellites over 360, 108, 40 and 20 mhz and the recording of the frequency drift during the rotation, the amplitude changes in the received waves and the detail of the signals are given. Due to suitable programming made beforehand these recordings can be automatically made. (Author)

AD-268 074 Div. 6, 8, 19
(TISTE/CRJ) OTS price $10.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADAR IN ENGINEERING EXPLORATIONS,
by N. T. Viduyev, V. P. Grzhibovskiy, and D. I. Rakitov. 30 Nov 61, 122p. incl. illus. tables, 59 refs. (Trans. no. MCL-1332 1+2 of Radiolokatsiya V Inzhenernykh Izyskaniyakh, Kiev, pp. 1-96, 1960)
Unclassified report

DESCRIPTORS: (*Radar, Radar equipment, Radar stations, *Geodesics, Radio.) (Translations, USSR, Technological intelligence.) (Radio waves, Propagation, *Radio transmission.) (*Range finding, Radar equipment, Display systems, Radio equipment.) (*Radar navigation, Shoran.)

Contents:
Radiogeodetic systems
Pulse methods of radiogeodetic measurement
Phase methods of radiogeodetic measurements

7. ELECTRICAL EQUIPMENT

AD-267 211 Div. 7, 14, 31
(TISTE/NTM) OTS price $1.10

Coast Guard, Washington, D. C.
TEMPERATURE LIMITATIONS OF THE ESNA 250-MM. LANTERN WITH PLASTIC LENS.
29 Nov 61, 2p. (Rept. no. 269)
(Proj. CGTD J24-2/1-8-7)
Unclassified report

DESCRIPTORS: (*Heat tolerance, *Incandescent lamps, *Plastic lenses, *Flash lamps, Tests, Coast Guard research.) (*Lighting equipment, Coast Guard, Naval equipment, Temperature, Heat.)

Tests are described that determine the maximum wattage lamp that may be used in a 250-mm marine lantern. Tests indicated that under direct summer sunshine in the vicinity of Baltimore, Maryland, the maximum permissive lamp wattages are 75, 150, and 400 watts for steady burning, 50% duty cycle, and 20% duty cycle respectively. These tests modify previous results presented in ASTIA Document AD-256 698. (Author)

AD-267 315 Div. 7
(TISTE/CDM) OTS price $4.60

ARINC Research Corp., Washington, D. C.
FAILURE RATES AND FAILURE MODES OF SMALL ROTARY ELECTRICAL DEVICES.
by William H. von Alven, H. Dagen and others.
Nov 61, 41p. incl. illus. tables (Publication no. 160-2-269)
(Contract AF 33(600)42462)
Unclassified report

DESCRIPTORS: (*Electrical equipment, Military equipment, *Reliability, Mathematical prediction.) (*Electric motors, Alternating current, Direct current, Synchro receivers, *Motor generators, *Servo motors, *Synchros, *Failure (Mechanics). Airborne, Shipborne.)

A review was made of all parts information from various system reliability programs conducted by the corporation in recent years. Relays were

the first part type to be studied (AD-254 186), and fractional horsepower rotating devices were second. Present effort is confined to fractional horsepower rotating devices and particularly with the observed field failure rates and failure modes for small ac and dc motors and various synchro and servo devices. As with relays, a 10-to-1 difference was detected between airborne and shipboard failure rates of small rotary electrical devices. The higher failure rates for airborne equipments are caused by many factors: environment such as temperature excursions, altitude, shock, and vibration; design limitations in which reliability is traded off against high performance for a given set of weight and space requirements; and applications problems. (Author)

AD-267 330 Div. 7, 25, 30
(TISTA/SEB) OTS price $9.10

Thompson Ramo Wooldridge, Inc., Cleveland, Ohio.
DESIGN STUDY FOR ADVANCED SOLAR THERMIONIC POWER SYSTEMS. ITEM II. PART I. VAPOR TYPE THERMIONIC GENERATOR.
Interim summary technical rept. no. 1.
Sep 60, 97p. incl. illus. (Engineering rept. no. 4166)
(Contract AF 33(616)7411, Proj. 0(3-3145); In cooperation with Thermo Electron Engineering Corp., Cambridge, Mass.)
(WADD TR 60-698, pt. 1)
Unclassified report

DESCRIPTORS: (*Thermionic emission, Generators, *Solar cells, Solar energy, Power supplies, Electric power production, Thermoelectricity, Design.) (Cesium, Vapors, Plasma physics.)

A survey of the state of the art of thermionic power generation was carried out as part of a design study for advanced solar thermionic power systems. The results are reported and serve as a basis for the preparation of a detailed design and test specification for two laboratory test models of thermionic generators. Part I of the report pertains to the Vapor Type Thermionic Generator, and Part II (AD-260 066) pertains to the Close-Spaced Vacuum Thermionic Generator. Part I describes the results of a design study on vapor type thermionic converters and establishes the design and test specifications for a laboratory test model Cs thermionic converter. The unit is rated at 28 volts, 250 watts electrical power output and consists of 2 identical Cs converters connected in series. The series combination voltage of 2.8 volts is converted to the specified 28 volts by an 80% efficient dc-dc transistorized converter. The gross power output from each Cs converter is 156 watts. (Author)

AD-267 519 Div. 7, 4, 25
(TISTM/TCG) OTS price $12.00

General Electric Co., Syracuse, N. Y.
UNIQUE PHOTOVOLTAIC CELLS.
Rept. for Apr 60-May 61,
ed. by J. F. Elliott. Aug 61, 148p. incl. illus. tables, 21 refs.
(Contract AF 33(616)7183, Proj. 3145)
(ASD TR 61-242) Unclassified report

DESCRIPTORS: (*Solar cells, *Photoelectric cells, Photochemical reactions, Photochemistry, Electric potential, Electric power production, Effectiveness, Surface area, Theory, Materials.) (Crystals, *Cadmium compounds, *Tellurides, *Nitrides, *Selenides, Films, Selenium, Silicon.) Intermetallic compounds, Semiconductors, Design, Configuration.)

Four major areas were investigated to improve the following figures of merit of photovoltaic solar energy converters; power output per unit cost, weight, or surface area. Polycrystalline CdTe was investigated as a solar cell material. The work has not established any fundamental physical reason why this material should not be useful. Attempts to construct a composite cell from a Se, CdN, or CdSe cell in optical series with a Si cell have not produced a composite cell with efficiency greater than that of the Si cell alone. The possibility of using a variable band gap material (i.e., material that has a band gap which is a function of one of the linear dimensions of the material) for a high efficiency converter was examined theoretically. This analysis indicates that present semiconductor materials have not reached a state of development which would permit a useful cell to be constructed. Different design considerations for a conventional Si solar cell were studied. Several would apparently make second order improvements in conversion efficiency. (Author)

AD-267 576 Div. 7
(TISTW/JRG) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
A RUGGED BLAST-SENSITIVE SWITCH,
by William G. Stange. Oct 54, 20p. incl. illus.
(BRL Technical note no. 950)
(AFSWP rept. no. 771)
Unclassified report

DESCRIPTORS: (*Blast, *Pressure, *Sensitivity, *Switches, Control for Ventilation ducts of Fortifications, Shelters, Design.) (*Pressure switches, Design.)

The design and construction of a rugged, weatherproof, blast-sensitive switch which has been tested at BRL are described in detail. A diaphragm is used in conjunction with a small switch producing a unit which is sensitive to shock pressure as low as 0.7 psi. (Author)

AD-267 592 Div. 7, 31
(TISTE/CDM) OTS price $1.10

Coast Guard, Washington, D. C.
SHELF LIFE OF 90-VOLT BATTERY FOR SEADROME LIGHT,
by J. M. O'Connell. 15 Sep 61, 9p. incl. illus.
(Proj. CGTD J16/1-2-7)
Unclassified report

DESCRIPTORS: (*Dry cells, Storage, Deterioration, Tests, Life expectancy.) (*Primary batteries, Runway lights, Airports.) Coast Guard research, Markers, Buoys.

A study was made of the effect of shelf life on the performance of two 90-v dry cell batteries. Four Burgess type 3M60 batteries stored for 14 months and 4 Eveready type X-511 batteries stored for 9 months were tested in comparison with 4 Eveready type X-511 batteries which were within 2 weeks of their manufacture. Using the standard Coast Guard seadrome light as a test load, operating time and ampere-hour capacity tests indicated that storage under conditions prevalent at the Coast Guard Supply Center had no effect on battery performance for the storage periods indicated. (Author)

AD-267 711 Div. 7
(TISTW/RD) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR OBTAINING A SEQUENCE OF NON-CORRELATED RANDOM VOLTAGE PULSES,
by V. N. Zhovinskiy and V. A. Koshelev.
20 Nov 61, 2p. (Trans. no. FTD-TT-61-208 of Byulleten' Izobreteniy, Patent no. 130242, 14:pp. 50, 1960)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Voltage, Generators.)

AD-267 721 Div. 7, 25
(TISTE/NTM) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF VISCOSITY ON THE PARAMETERS OF A MAGNETOGASDYNAMIC GENERATOR,
by L. I. Grekov and O. N. Favorskiy. 3 Nov 61, 16p. incl. illus. (Trans. no. FTD-TT-61-137 of Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika i Avtomatika No. 4:46-54, 1961)
Unclassified report

DESCRIPTORS: (Viscosity, *Generators, *Thermoelectricity, Magnetic fields, *Magnetohydrodynamics, *Plasma physics, Gas flow, Fluid flow, Differential equations, Power plants, Gas turbines, Induction generators.) (Translations, Technological intelligence, USSR.)

A new prospect was noted in the development of electrical machine design: the production of electrical energy from thermal energy using a magnetogasdynamic generator (MGD generator). This type power installation cannot be classified among the so-called devices for the direct conversion of thermal energy into electrical. However, the production of electrical energy during the interaction of a magnetic field and a moving stream of conducting gas, making it possible, in principle, to dispense with the mechanical generator, was of interest. This interest in such installation was increased by the possibility of obtaining essentially higher efficiencies, sometimes to 60%, in installation with MGD generators, with simultaneously lower fuel consumption than in the best turbogenerator installations. The basic properties of MGD generators are usually analyzed on the basis of solution of the differential equations which describe the one-dimensional flow of a conducting fluid in a transverse magnetic field. (Author)

AD-267 723 Div. 7
(TISTW/RD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE PROBLEM OF INCREASING THE EFFICIENCY AND POWER OF GAS-TURBINE POWER PLANTS,
by D. P. Gokhshteyn. 20 Nov 61, 15p. incl. illus. table (Trans. no. FTD-TT-61-132 of Teploenergetika 12:33-38, 1960)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Power plants, *Gas turbines, Design, Heat transfer, Heat exchangers, Exhaust gases, Fluorides, Chlorides, Methanes, Carbon dioxide.) Electric power production.

The following conclusions were drawn for increasing the efficiency and power of gas turbine power plants: (1) A significant decrease in the irreversibility of the heat exchange between the exhaust gases of a gas-turbine power plant and the ambient medium can be achieved by creating combination steam-gas power plants, in which the steam portion operates with supercritical initial parameters. By using a freon cycle as the utilization steam power cycle the relative fuel economy can amount to 10-13%. The economy is even greater, when a gas-turbine power plant is combined with steam-water power plants of type SKK. (2) The use of combination heat regeneration in carbon-dioxide power plants makes them promising for medium and high capacities. Of special interest is the possibility of obtaining several hundred megawatts per exhaust; and (3) The examples given are not optimum ones. To achieve the maximum economic effect in the designs considered, it was necessary to carry out theoretical and experimental investigations, the purpose of which were to ascertain the optimum parameters of the designs and to obtain the optimum technological and economic indices. (Author)

AD-267 940 Div. 7, 26, 4
(TISTM/EJH) OTS price $2.60

Cornell-Dubilier Electric Corp., New Bedford, Mass.
PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200 C.
Quarterly rept. no. 2 for period ending 27 Oct 61,
by L. E. Nordquist. Oct 61, 22p. incl. illus. table.
(Contract DA 36-039-sc-85955)
Unclassified report

DESCRIPTORS: (*Ceramic capacitors, Capacitors, Materials, Dielectrics, Preparation, Processing, Production, Heat treatment, Fluorination, Dielectric properties, Resistance, High temperature research.) (*Barium compounds, Titanates, Mixtures with Calcium compounds, Zirconates.)

The improvement of titanate dielectrics by high temperature fluorination presents a problem in composition and treatment involving narrow working limits. For many compositions the fluorination treatment is critical and one can easily over or under fluorinate. Capacitor discs of high K composition were fluorinated by pushing setters containing the discs through a tunnel kiln treated with a single charge of volatile fluorides. This resulted in a complete range of fluorination treatment during the run. Continuous fluorination runs were made by placing a smaller amount of volatile fluorides on each setter during the run. This resulted in a continuous output of discs having the improved properties attributed to fluorination. Insulation resistance measurements of the well fluorinated discs at elevated temperatures showed a marked improvement over those which were not fluorinated. Optimum fluorination results in a chrome yellow color in the dielectric, while over fluorination gives a bluish color. (Author)

Division 7 - ELECTRICAL EQUIPMENT

AD-267 964 Div. 7, 8
(TISTM/EJT) OTS price $4.60

Chicago Telephone Supply Corp., Elkhart, Ind.
PRODUCTION ENGINEERING MEASURE FOR SUBMINIATURE, TRANSISTOR TYPE POTENTIOMETERS.
Quarterly progress rept. no. 1, 1 July-30 Sep 61, by C. L. Holmes, Sr. 30 Sep 61, 41p. incl. illus. tables.
(Contract DA 36-039-sc-85976)
Unclassified report

DESCRIPTORS: (*Potentiometers, *Transistors, Subminiature electrical equipment, Materials, Machine tools, Design, Manufacturing methods, Production, Tests, Subminiature electronic equipment.)

Basic and detailed design of both the flat mount and bushing mount 3/8 inch diameter subminiature potentiometer styles were completed, and assembly drawings with explanations are presented. A discussion of various design problems encountered is presented. Sample models of the bushing mount and flat mount controls were evaluated. A carbon-graphite contact shoe in conjunction with a metal bridging contact will be used. Terminations to the resistive element will be made by means of gold-plated terminals and conductive epoxy. The substrate will be steatite or alumina ceramic. (Author)

AD-267 996 Div. 7, 8
(TISTE/CDM) OTS price $1.60

Ling Electronics, Anaheim, Calif.
(No title).
Final rept.
1961. 12p. incl. illus. table.
(Contract Nonr-293900)
Unclassified report

DESCRIPTORS: (*Frequency converters, *Inverted rectifiers, Design, Alternating current.) (Power supplies, Amplifiers, Electronic circuits, Switching circuits, *Inverter circuits.)

Efforts were successfully completed on a working device which delivers to a 3-phase, 8 ohm load, 10 kw of power in the frequency range of 0 to 3500-c, as determined by an external sine or square wave oscillator (not a part of the equipment supplied). The goal of this work was to convert a direct current voltage to a variable frequency altenating voltage at a power level of 10 kw in a very small package and with as high conversion efficiency as possible. The multiple phase inverter is capable of generating waveform similar to sequentially switched power supplies. The problem of circuit protection against faults is simple and the bridge circuit eliminates the need for bidirectional switches. A 3-phase version was constructed and packaged in a steel box 9 inches cube. This transmitter was operated at 10 kw power level from 20 to 3500 c without load adjustment. (Author)

AD-268 050 Div. 7, 8
(TISTE/CRJ) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A PULSE TRAIN GENERATOR,
by L. N. Bureyev. 29 Nov 61, 2p. incl. illus.
(Trans. no. FTD-TT-61-212 of Byulleten' Izobreteniy, No. 18, Patent no. 131977:55-56, 1960)
Unclassified report

DESCRIPTORS: (*Pulse generators, Design.) (Technological intelligence, Translations, USSR.) (Generators, Circuits.)

A pulse train generator consisting of a units (in the presence of a pulse) and b zeroes (in the absence of a pulse) is discussed and has the following special feature: to simplify the design and to insure that stable pulse trains will be obtained, it is provided with a delay line of length b - a of the sequential iteration of pulses, whose b - a outputs are correspondingly connected with the b - a by additional inhibitory inputs of the coincidence circuit, to which the pulse (units) generator is connected. (Author)

AD-268 057 Div. 7, 4
(TISTM/REB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD OF MANUFACTURING ELECTRODES FOR CHEMICAL CURRENT SOURCES,
by K. S. Sasinovskiy, L. N. Maksimova and others.
1 Dec 61, 2p. (Trans. no. FTD-TT-61-260 of Byulleten Izobreteniy, Patent No. 133503, No. 22:19-20, 1960)
Unclassified report

DESCRIPTORS: (*Electrodes, Manufacturing methods, Chlorides, Copper compounds, Tin compounds, Potassium compounds, Pitch, Sintering.) (USSR, Translations, Technological intelligence.)

A method is presented for the manufacture of electrodes for chemical current sources, e.g., the cathodes of copper-magnesium elements, using an active material which contains cuprous chloride, stannous chloride, and potassium chloride as its components. To increase the active surface and the electrical conductivity of the electrodes, the active mass contains an additional component, a cathode material, consisting of a finely-ground mixture of petroleum coke (about 80%) and petroleum pitch (about 20%). After these are mixed with the basic components, electrodes are prepared by pressing and sintering at a temperature of about 140 C. (Author)

AD-268 071 Div. 7
(TISTE/CRJ) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN AUTOMATIC CHARGE CUT-OFF FOR SILVER-ZINC STORAGE BATTERIES,
by K. P. Nefedov. 1 Dec 61, 3p. incl. illus.
(Trans. no. FTD-TT-61-172 of Byulleten' Izobreteniy, Patent no. 130547, No. 15:32-34, 1960)
Unclassified report

DESCRIPTORS: (*Storage batteries, *Voltage regulators, Electric discharges, Switching circuits, Circuits, Triodes.) (Silver, Zinc.) (Technological intelligence, Translations, USSR.)

A description is given of a device for the automatic charge cut-off of silver-zinc storage batteries; it has an electromagnetic relay as the

executive unit, a source of control voltage fed to the voltage dividers in the main triode circuits, and indicator lights. Its distinguishing feature is that to avoid discharge of the electrodes during charging, and to cut-out fully-charged and faulty storage batteries from the charging circuit, triodes are used as the relays for the voltage which actuates the executive unit. (Author)

AD-268 094 Div. 7, 8, 9, 26
(TISTE/CRJ) OTS price $1.00

Stanford Research Inst., Menlo Park, Calif.
FEASIBILITY STUDY OF VIBRATION AND SHOCK EXCITER USING ELECTRIC FIELD MODULATION OF HYDRAULIC POWER.
Rept. for Dec 59-Mar 60 on Flight Vehicle Environmental Investigations,
by John J. Eige and Edward C. Fraser. July 61, 27p. incl. illus.
(Contract AF 33(616)6942, Proj. 1309)
(WADD TR 61-185) Unclassified report

DESCRIPTORS: (*Crystal oscillators, Modulators, Vibration, Shock, Design.) (*Shear stresses, Control, *Hydraulic fluids, *Electric fields, *Magnetic fields.) (*Hydraulic power systems, Electric fields, Modulation.)

A feasibility study was made of the use of magnetic fields controlling shear stresses in magnetizable fluids and of electric fields controlling shear stresses in electrically active fluids, for driving a high-power, high-frequency vibration and shock exciter. This report is concerned with the actual design, construction, and testing of a prototype shock-shaker. A theoretical analysis of the electric-fluid mechanics is presented. The prototype demonstrated the technical feasibility of electric-field valving of hydraulic power in a shock-shaker. The peak accelerations and frequency bandwidth were less than the specifications because of deliberate lack of refinement of this first experimental model and because the only available fluid had a lower sensitivity than the earlier fluids. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

8. ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-267 117 Div. 8
(TISTE/CRJ) OTS price $3.60

Research Inst., U. of Michigan, Ann Arbor.
A STUDY OF TRAVELING-WAVE DIRECTIONAL FILTERS WITH WIDEBAND FERRITE TUNING,
by D. K. Adams. Apr 61, 26p. incl. illus. 10 refs. (Technical rept. no. 106; 2899-22-T)
(Contract DA 36-039-sc-78283, Proj. 3A99-06-001-01)
Unclassified report

DESCRIPTORS: (*Radiofrequency filters, *Cavity resonators, Phase shifters, Narrowband, Design, Analysis.) (*Tuning circuits, Waveguide couplers, Coupling circuits, Ferrites, Mathematical analysis.)

Consideration is given to the possibility of employing ferrite for wideband frequency tuning in a class of narrowband, reflectionless filters employing traveling-wave resonators. Theoretical arguments are presented for choosing a symmetrically loaded cylindrical resonator as the tunable resonator for this filter. An experimental model was constructed using the ring geometry. This device has a tuning envelope with less than 10 db insertion loss and more than 20% bandwidth at X-band. Suggestions are given regarding possible methods of improving these values, particularly the rather high insertion loss. (Author)

AD-267 147 Div. 8
(TISTE/NTM) OTS price $19.75

Philco Corp., Palo Alto, Calif.
DESIGN CRITERIA FOR A LARGE MULTI-PURPOSE TRACKING ANTENNA,
by J. M. Stephenson, J. D. Bowes and others.
20 Jan 61, 302p. incl. illus. tables (Rept. no. WDL-TR 1368)
(Contract AF 04(647)532)
Unclassified report

DESCRIPTORS: (*Radar tracking, *Communication equipment, *Parabolic antennas, Data transmission systems, Design, Radio receivers.) (*Radar antennas, *Antennas, *Tracking, Conical antennas, Microwaves, Radiofrequency, L band, S band, Communication systems, Mathematical analysis.) (Satellite vehicles, Space probes, Spaceships, Tracking.) Servo systems.

Efforts were made to determine analytically many of the parameters required for the design of a multipurpose antenna system operating in the 400 and 2000 mc frequency bands for the tracking of and communication with earth satellites. Research is presented in the following areas: (1) design criteria for a large multi-purpose tracking antenna, (2) analyses of tracking techniques, (3) conscan vs monopulse, (4) microwave system design theory, (5) receiving system for multipurpose tracking antenna, (6) the antenna servo system, (7) acquisition analysis, and (8) tracking error analysis.

AD-267 166 Div. 8
(TISTE/CDM) OTS price $2.60

Stanford Electronics Labs., Stanford U., Calif.
ATTEMPTS TO MEASURE THE FARADAY ROTATION AND FADING RATES OF MOON-REFLECTED RADIO SIGNALS AT 23.1mc,
by H. D. Webb. 25 Aug 61, 26p. incl. illus. 13 refs. (Scientific rept. no. 3)
(Contract AF 19(604)7436)
(AFCRL 795) Unclassified report

DESCRIPTORS: (*Radio signals, Reflection, Moon, *Magneto-optic rotation, Measurement.) (Ionospheric propagation, Radio transmission, *Wave transmission, Polarization, Correlation techniques.) Radio astronomy.

A method of measuring the Faraday rotation of the plane of polarization of a radio wave on a trip to and from the moon is briefly described. Equations are presented which may be used to calculate the total electron content in the ionosphere, using the Faraday fading period and the difference between the polarization angles at 2 frequencies. Criteria are given for selecting the second frequency. The methods of analyzing the data to determine the Faraday fading period and polarization difference are described. A method of correlation analysis is presented. Equations are given for calculating the autocorrelation, cross-correlation, and spectra from experimental data. The methods of data analysis are applied to data taken on 31 July 1960. (Author)

AD-267 173 Div. 8
(TISTE/NTM) OTS price $5.60

Tennessee U. Engineering Experiment Station, Knoxville.
THE APPLICATION OF CIRCULAR ARRAY THEORY TO THE CORNER REFLECTOR ANTENNA,
by A. C. Horsnell, H. P. Neff, and J. D. Tillman.
1 Oct 61, 54p. incl. illus. tables, 14 refs. (Technical rept. no. 2)
(Contract Nonr-81105)
Unclassified report

DESCRIPTORS: (Antennas, *Radar corner reflectors, Antenna radiation patterns, Theory.) (Reflectors, *Dipole antennas, Electric currents, Mathematical analysis.)

The application of the theory of circular antenna arrays to the corner reflector antenna is described. Circular array theory is summarized and applied to corner reflectors with elements on the axis, to half-circular arrays with a plane reflector, and to arc arrays in corner reflectors. Methods of designing corner reflector arrays to give specified patterns are given, and considerable data of use to a designer are presented. (Author)

AD-267 175 Div. 8
(TISTE/CDM) OTS price $3.60

Westinghouse Electric Corp., Elmira, N. Y.
LOW NOISE, LINEAR, VARIABLE GAIN R. F. AMPLIFIER.
Quarterly rept. no. 4, 16 Mar-15 June 61,
by J. P. Pietrzyk, A. Van der Jagt and R. Pear.
12 July 61, 31p. incl. illus. tables.
(Contract NObsr-81509, Proj. SR 0080302)
Unclassified report

DESCRIPTORS: (*Radiofrequency amplifiers, Linear systems, Noise (Radio), *Radio interference, Analysis, Reduction.) (*Electron tubes, Deflection, Electron beams, Tetrodes, Diodes, Space charges.) (Electronic circuits, Design, Tests, Harmonic analysis, Mathematical analysis.) (Cathodes (Electron tubes), Linear systems, Amplifiers.)

Contents:
Single linear tube approach
  Technical approach
    Deflection tube
    Improved single model
    Multiple tube
    Space charge influence
  Conventional tube approach - Experimental tube type WX-4733A
  A special cathode with linear characteristic. Tests on an experimental diode
  An experimental tetrode WX-4733 utilizing the special linear cathode
  Comparison measurements on available types: 6AQ5, 6AK6, 7360, and 6AB7
  Preliminary cross modulation measurements on the RBC-2 Navy receiver

AD-267 193 Div. 8, 25
(TISTB/CCH) OTS price $1.60

Naval Research Lab., Washington, D. C.
THE SYNTHESIS OF AN ANTENNA WITH A GAUSSIAN-SHAPED RADIATION PATTERN.
Interim rept.,
by O. D. Sledge. 11 Aug 61, 12p. incl. illus. tables (NRL rept. no. 5649)
Unclassified report

DESCRIPTORS: (*Antenna radiation patterns, Synthesis, *Fourier analysis, *Statistical processes.) Antennas.

Direction finders of the stacked-beam type exhibit optimum performance if the beam shape remains essentially Gaussian in all elevation planes which lie in the major lobe of the principal azimuth-plane pattern. The method of synthesis, an extension of Woodward's method, includes the effects of the phase distribution in the aperture. For a prescribed Gaussian shape of the major lobe of the radiation pattern in the principal elevation plane, several antenna apertures have been synthesized. The radiation patterns in certain off-axis elevation planes were calculated for each of the synthesized apertures. One aperture, in particular, exhibits the desirable property that the prescribed shape of the major lobe of the radiation pattern is preserved quite well in all the elevation planes at azimuth angles extending out to the -6 db point of the principal azimuth-plane pattern. (Author)

AD-267 213 Div. 8, 25
(TISTE/CRJ) OTS price $9.60

Airborne Instruments Lab., Inc., Deer Park, Long Island, N. Y.
DEVELOPMENT OF A LOW-NOISE RAPIDLY TUNABLE SOLID-STATE AMPLIFIER.
Final rept.,
by S. Okwit and E. W. Sard. Aug 61, 1v. incl. illus. tables, 16 refs. (Rept. no. 8288-1)
(Contract AF 30(602)2197, Proj. 5573)
(RADC TR 61-212) Unclassified report

DESCRIPTORS: (*Parametric amplifiers, *Microwave amplifiers, *Backward-wave amplifiers, Semiconductors, Transmission lines, Diodes, Ultra high frequency, Design.) (Semiconductors, Quantum mechanics, Microwave amplifiers, Diodes.) (Semiconductors, Parametric amplifiers, Variable capacitors, Space charges.) (Amplifiers, Noise (Radio), Mathematical analysis.)

Efforts were continued on the feasibility of a low-noise solid-state amplifier capable of being rapidly tuned in less than 0.1 millisecond over the 250 to 500 mc range. The backward-wave parametric amplifier (BWPA) was found to be most practical. However, the conventional BWPA has many disadvantages. As a result, 2 new BWPA configurations that eliminate or minimize these disadvantages were evolved: (1) semiconventional operation using 2 forward-wave transmission lines, and (2) constant idler output frequency operation using one forward-wave and one backward-wave transmission line and using 2 forward-wave transmission lines. These were analyzed in detail and the predicted operation verified experimentally. A UHF model of the BWPA was designed, fabricated, and successfully operated using 2 forward-wave transmission lines having a constant idler output frequency. The amplifier used 19 varactor diode pairs and yielded gains in excess of 20 db over the 230 to 500 mc frequency band; the noise temperature was less than 135 K. (Author)

AD-267 214 Div. 8
(TISTE/NTM) OTS price $2.60

Airborne Instruments Lab., Inc., Deer Park, Long Island, N. Y.
HIGH-FREQUENCY ANTENNA TECHNIQUES,
by John F. Ramsay. Aug 61, 23p. illus. 11 refs.
(Rept. no. 1205-I-1)
(Contract AF 30(602)2529, Proj. 4506)
(RADC TN 61-234) Unclassified report

DESCRIPTORS: (*Slot antennas, *High frequency, Waveguides, Antenna radiation patterns.) (Antennas, L band, Coaxial cables, Polarization, Range, Wire, Impedance, Measurement.)

Two methods of making efficient, low-height, high-frequency antennas are to be evaluated: (1) using a skeleton slot to obtain a low-height, vertically polarized, wire-slot array over a ground plane; (2) using a microwave trough-waveguide antenna. The first method was investigated during the report period. Three-dimensional patterns of single and double wire-slot antennas were measured in 2 polarizations and they agree with theoretical predictions. Measurements indicate that acceptable impedance levels can be obtained; the gain measurements must be further refined for reliability. Theoretical analyses were made of antenna patterns, polarizations, impedance, and gain. (Author)

AD-267 216 Div. 8, 25, 32
(TISTB/CCH) OTS price $1.25

Diamond Ordnance Fuze Labs., Washington, D. C.
SEARCHING THE LITERATURE FOR TRANSDUCER INFORMATION, A SURVEY OF THE FIELD.
Supplement no. 1 to pt. 2,
by J. Pearlstein. 10 Nov 61, 46p. (DOFL rept. no. TR-996; Suppl. to rept. no. TR-898, AD-249 131)
(Proj. 30330)
Unclassified report

DESCRIPTORS: (*Literature, *Bibliography, *Transducers.) Measurement, Instrumentation, Physical properties, Chemical properties, Scientific research.

An annotated bibliography is presented of state-of-the-art surveys pertaining to the availability, application, design, calibration, and testing of transducers. The references were collected during 1961 and are supplementary to those presented in DOFL report TR-898, Searching the Literature for Transducer Information, Part II. A Survey of the Field, 1 December 1960. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-267 233 Div. 8, 26
(TISTE/CDM) OTS price $4.60

Motorola, Inc., Phoenix, Ariz.
INDUSTRIAL PREPAREDNESS MEASURE. 400 MC, 300 MW POWER TRANSISTOR.
Quarterly rept. no. 1, 23 June-23 Oct 61, on Step 1,
by Rodney H. Abshire, John C. Howe, and D. L. Grady. 23 Oct 61, 42p. incl. illus. tables.
(Contract DA 36-039-sc-85975)
Unclassified report

DESCRIPTORS: (*Transistors, Microwave equipment, Radiofrequency power, Ultra high frequency, Production, *Manufacturing methods, Military requirements, Specifications.) (Transistors, Semiconductors, Germanium, Design.)

Research was undertaken on the production engineering, fabrication and testing of a 400 mc 300 mw power transistor. The first samples have a 3-stripe geometry on an epitaxial PNP germanium Mesa structure. Design and process engineering efforts were concentrated upon meeting the required combination of frequency (400 mc) and output power (300 mw) at 10 db minimum power gain rating. From initial distributions of parameters it is apparent that many objective specifications can be met as initially specified, whereas some parameters (under present design) would probably have to be adjusted to permit meeting the 10 db minimum power gain spec. Power gain appears to be the ultimate parameter. (Author)

AD-267 240 Div. 8
(TISTE/CRJ) OTS price $11.00

General Electric Co., Owensboro, KY.
RESEARCH AND INVESTIGATION ON RADIATION RESISTANT, HIGH TEMPERATURE THERMIONIC CIRCUITRY.
Interim engineering rept. no. 2, 1 July-30 Sep 61,
by Fred J. Schmidt. 30 Sep 61, 128p. incl. illus. tables.
(Contract AF 33(616)8096)
Unclassified report

DESCRIPTORS: (*Electronic circuits, High temperature research, Thermionic emission, Radiation damage.) (Circuits, *Electron tubes, *Diodes, Triodes, Electrical properties, Mechanical properties, Processing, Materials, Shock resistance, Life expectancy, Titanium.) (*Resistors, *Carbon resistors, Materials, Tungsten, Molybdenum, Life expectancy.) (*Capacitors, Materials, Dielectrics, Ceramic materials, *Variable capacitors, *Mica capacitors.)

Contents:
Tube development
Resistor development
Capacitor development
Inductor development
Circuit development
Materials investigation

AD-267 248 Div. 8, 25
(TISTE/CRJ) OTS price $11.00

Shockley Transistor Corp., Mountain View, Calif.
STRUCTURAL IMPERFECTIONS IN SILICON P-N JUNCTIONS.
Interim scientific rept. no. 1, 1 Mar-15 Aug 61,
by A. Goetzberger and H. Queisser. 31 Aug 61, 148p. incl. illus. tables.
(Contract AF 19(604)8060)
(AFCRL-794) Unclassified report

DESCRIPTORS: (*Transistors, Silicon, Chemical impurities, Distribution, *Surface properties, Diffusion, *Crystal structure, Lattices, Processing, Growth.)

Four areas of investigation were completed. A study was made of a technique for measurement of the depth of diffused layers in silicon by a grooving method reported here in detail for the first time. An application is described of the anodic sectioning technique to the measurement of impurity distribution in thin diffused layers. The second area covers investigation of the structure of small angle grain boundaries in silicon and their effect on the diffusion of doping agents. Diffusion-induced slip in silicon appears to be caused by the diffusion of small substitutional atoms of the doping agent, such as boron, which create mechanical stresses within the heavily doped surface region of the silicon. This stress is apparently relieved by formation of dislocation arrays which become visible upon etching of the surface. A study was also made which was supported only in part under this contract covering impurity induced pipes through diffused layers in silicon. (Author)

AD-267 269 Div. 8, 30
(TISTE/NTM) OTS price $7.60

Bay State Electronics Corp., Boston, Mass.
FABRICATION OF TRANSISTORIZED AND MINIATURIZED RECEIVERS.
Final rept.,
by Harry E. Brawley, Jr. 16 June 61, 79p. incl. illus. tables.
(Contract AF 19(604)5985)
(AFCRL-576) Unclassified report

DESCRIPTORS: (Radio receivers, Medium frequency, *Transistors, *Miniature electronic equipment, Electronic circuits, Tuned circuits, Measurement, Space flight, Cosmic ray bursts, Radio interference, Signal-to-noise ratio, Mathematical analysis, Design.) (Research test vehicles, Radio receivers, Airborne, Space environmental conditions, Shock, Vibration, Temperature, Tests.)

The development is presented of a set of transistorized, miniaturized 1.5 mc. receivers for measurement of cosmic noise above the earth's ionosphere. Three tuned radio frequency receivers were constructed, with center frequency 1480 kc., bandwidth 40 kc., and noise figure 3.5 db. Provision was made for periodic receiver calibration. The receivers successfully withstood shock, vibration, temperature and vacuum tests representative of the Atlas vehicle environmental conditions. (Author)

AD-267 301 Div. 8, 25
(TISTE/CRJ) OTS price $3.60

David Sarnoff Research Center, Princeton, N. J.
LOW-NOISE MICROWAVE TUBES.
Semi-annual rept. no. 2, 1 Feb-31 July 61,
by S. Bloom, A. L. Eichenbaum and others.

15 Oct 61, 14p. illus.
(Contract DA 36-039-sc-87393, Proj. 3-99-15-504)
Unclassified report

DESCRIPTORS: (Electron tubes, *Traveling wave tubes, Microwave equipment, Plasma physics, *Cathodes (Electron tubes), Lithium, Design.) (Traveling wave tubes, *Cesium electron tubes, Electron guns, Noise (Radio), Noise (Radar).) (Space charges, Microwaves, Damping.)

A traveling-wave tube was built which used a beam extracted from a lithium plasma. The plasma was produced by mixing the electrons from an L-cathode and the ions from heated Beta-eucryptite. The tube had a noise factor of 5.7 db, considered a low value in view of the fact that little transformer optimization was possible and that the L-cathode was operated at 1500 K. These conditions are remediable. An improved cesium hollow cathode was developed which employs a slit-feed, for controlled cesium flow, and a filter. This structure was incorporated into a standard TWT and is ready for noise tests. DC studies of this plasma cathode showed it to be capable of delivering 100-150 muA of extracted beam current with an electron temperature of only 750 K. Pinhole studies were made of beams from conventional TWT guns. It was found that near conditions of low-noise operation a virtual cathode formed between the cathode and first anode. Virtual cathode effects intentionally produced between the second and third anodes were found to exhibit sharp transitions and hysteresis only if ions were present. Pinhole measurements of electron temperature showed that the temperature was proportional to current density; thus, with positive beam-forming voltages, the beam edge was always hotter than the beam core. (Author)

AD-267 327 Div. 8, 17, 14
(TISTM/REB) OTS price $4.00

Radio Corp. of America, Harrison, N. J.
A MANUAL OF MATERIALS FOR MICROWAVE TUBES.
Rept. on High Temperature Microwave Tube Design and Processing,
by D. L. Thornburg, E. S. Thall, and J. Brous.
Jan 61, 238p. incl. illus. tables, 114 refs.
(Contract AF 33(616)6563, Proj. 4156)
(WADD TR 60-325) Unclassified report

DESCRIPTORS: (*Electron tubes, *Microwave equipment, *Materials, *Handbooks.) (Metals, Alloys, Metallic compounds, Physical properties, Chemical properties, Mechanical properties, Electrical properties.) (*Cathodes (Electron tubes), Thermionic emission, Gases.) *Bibliography, High temperature research.

A compilation is presented of data and information on the properties of 22 materials considered important in the design of high-temperature microwave tubes. Also included is a discussion of the poisoning effects of gases and metallic vapors on thermionic emitters of various types. (Author)

AD-267 329 Div. 8
(TISTE/NTM) OTS price $2.60

Sperry Gyroscope Co., Great Neck, N. Y.
BEAM-TYPE PARAMETRIC AMPLIFIER.
Technical note no. 3, 1 July-30 Sep 61,
by G. White, R. Eng, and A. Ferello. Oct 61, 16p. incl. illus. (Rept. no. NA 8210-8264-3)
(Contract AF 30(602)2433, Proj. 5573)
(RADC TN 61-237) Unclassified report

DESCRIPTORS: (*Parametric amplifiers, Microwave amplifiers, Broadband, Narrow band, S band, C band, Electron guns, Noise (Radio), Reduction, Waveguides, Design.) (Electron beams, Electron tubes, Magnetic fields, Impedance, Coupling circuits, Phase measurement, Tests.) (Amplifiers, Cavity resonators, Backward-wave oscillators, Helixes.)

The study concerns degenerate parametric amplification of 5-kmc signals with 10-kmc pumping, and non-degenerate parametric amplification of 5-kmc signals with 35-kmc pumping (30-kmc idler). Pump circuit study results are discussed and the advantages of using the quadrifilar helix as the pump circuit are summarized. To make comparison of different types of pump circuits possible, a Pierce impedance definition for the pump circuit is discussed in connection with pump gain calculations. Study results of the coupler characteristics are described. For the voltage-tuned operation, several possible modes of operation are described and the advantages and disadvantages of each are discussed. (Author)

AD-267 356 Div. 8
(TISTE/CDM) OTS price $1.60

Battelle Memorial Inst., Columbus, Ohio.
A STUDY OF FIELD-EMISSION CATHODES FOR SELECTED HIGH-POWER TUBES.
Summary rept. 21 Aug-25 Sep 61.
5 Oct 61, 17p.
(Contract SD-80)
Unclassified report

DESCRIPTORS: (*Field emission, *Cathodes (Electron tubes), *Electron tubes, *Microwave equipment, Switching circuits, Scientific research, Industrial research.)

Results are presented of a one-month study of the U. S. research, development, and application activities on field-emission (FE) cathodes for microwave power tubes, millimeter-wave tubes, and high-power switch tubes. The increasing demands imposed on high-power microwave tubes, millimeter-wave tubes, and high-power switch tubes have necessitated continuing efforts to achieve improvements in high-current-density cathodes and high-intensity, electron-beam generation methods. The use of Fe cathodes represents one approach which has been investigated in an attempt to solve the high-current-density cathode problem. The study was based significantly on information obtained by searching the published literature and available reports, and by personally discussing various aspects of the problem with people associated with the U. S. electron-tube industry. During the period, 25 companies and universities were contacted; their names and those of the individuals involved at each organization are listed. (Author)

AD-267 372 Div. 8
(TISTM/EJH) OTS price $10.50

Electron Tube Research Lab., U. of Minn., Minneapolis.
STUDIES ON BASE NICKELS FOR OXIDE-COATED CATHODES.
Final rept., 15 Apr 58-28 Feb 61,
by D. E. Anderson. 28 Feb 61, 105p. illus. 24 refs.
(Contract AF 19(604)3890)
(ASCRL-924) Unclassified report

DESCRIPTORS: (*Oxide cathodes, *Cathodes (Electron tubes), Semiconductors, Coatings,

Ceramic coatings, Alkaline earth metals, Thickness, *Thermionic emission, Vaporization, Temperature, High temperature research.) (Thin films, Coatings, Ceramic materials, Alkaline earths, Reduction, Nickel, Nickel alloys, Aluminum alloys, Chemical impurities, Adsorption.) (Anodes (Electron tubes), Titanium)

Techniques developed for uniform preparation of oxide coatings, and for processing and pumping the experimental structures, are summarized. Results of chemical activation of oxide cathodes using a variety of activating techniques are presented. These techniques include the use of normal single-additive alloy bases, carbon-nickel diffusion couples, a controllable carbon source, and the controlled exposure to Ba and Mg vapor. Results demonstrate that high, stable emission levels can be maintained for extended periods of cathode operation even in the presence of a declining rate of coating reduction if competing effects can be sufficiently minimized. An investigation of the response of oxide cathodes to step changes in temperature is described, showing both long-term and short-term changes in emission. Studies of the deactivation of oxide cathodes indicated that anode bombardment results in cathode deactivation as a consequence of the dissociation of impurity compounds evolved from the cathode, rather than by dissociation of alkaline-earth metal oxides on the anode. (Author)

AD-267 384 Div. 8
(TISTE/NTM) OTS price $2.60

Lockheed Missiles and Space Co., Sunnyvale, Calif.
DESIGN PROCEDURES FOR FILM-TYPE DISTRIBUTED-PARAMETER NETWORKS,
by W. W. Happ and W. D. Fuller. 1961, 9p. illus. tables, 9 refs. (Rept. no. LMSC 6-90-61-108)
Unclassified report

DESCRIPTORS: (*Electrical networks, *Thin films, *Electronic circuits, Design, Reliability, Synthesis.) (Communication systems, Capacitors, Resistors, Circuits, Materials.)

Design procedures for thin film circuits using distributed parameter networks are more complex than those of lumped parameter circuits. The designer synthesizes network functions rather than component assemblies in a continuous pattern that tends to minimize junctions between dissimilar materials and the volume of the subsystem. The required design tools are techniques for subnetwork generation, asymptotic techniques for the construction of Bode and Nyquist graphs of a d-p function, catalogues of thin film network morphologies, basic component relationships, a knowledge of materials and processes, and an intuitive understanding of descriptive geometry. These techniques, tools and procedures will be illustrated by the design of a bandpass amplifier in a companion paper. (Author)

AD-267 387 Div. 8, 25, 5, 30
(TISTE/CRJ) OTS price $16.50

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
(No title).
Quarterly progress rept. no. 63,
by H. J. Zimmermann, G. G. Harvey, and W. B. Davenport, Jr. 15 Oct 61, 251p. incl. illus. tables.
(Contract DA 36-039-sc-78108, Proj. 3-99-00-000)
Unclassified report

DESCRIPTORS: (*Scientific reports, *Electronics, Plasma physics, Microwave spectroscopy, Nuclear magnetic resonance, Hyperfine structure, Microwaves, Molecular beams, Communications theory, Data processing systems, Data transmission systems, Acoustics, Speech, Communication systems, Biophysics, Neurology, Physiology, Computers, Solid state physics, *Physics.)

Contents: Physical electronics, Plasma dynamics, Solid state physics, Microwave spectroscopy, Nuclear magnetic resonance and hyperfine structure, Microwave electronics, Molecular beams, Statistical communication theory, Processing and transmission of information, Physical acoustics, Speech communications, Linguistics, Communications biophysics, Neurophysiology, Neurology, Computer components and systems.

AD-267 399 Div. 8
(TISTE/CDM) OTS price $2.60

Sperry Gyroscope Co., Great Neck, N. Y.
TRAVELING-WAVE TUBE MIXER PROGRAM,
Interim engineering rept. no. 2, 1 July-31 Oct 61,
by I. Itzkan, L. Magill and P. R. McIsaas.
Nov 61, 29p. incl. illus. tables, 8 refs.
(Rept. no. NA-8210-8283-2)
(Contract AF 33(616)8074)
Unclassified report

DESCRIPTORS: (*Traveling wave tubes, *Mixer tubes, *Microwave amplifiers, Helixes, Mathematical analysis, Design.) (Waveguide couplers, Coupling circuits, X band, L band, *Microwave oscillators.) (*Parametric amplifiers, Electron beams, Tests, Space charges.)

An experimental 2 helix traveling-wave tube mixer was designed and construction has begun. Calculation of the anticipated mixing action, conversion gain, helix loss, coupler design and the problems associated with external helix coupler design are presented. After a thorough analysis of the previously posed beam pumped parametric amplifier, it was decided that no further consideration be given to the device. Conclusions based on data gathered are presented. (Author)

AD-267 400 Div. 8
(TISTE/NTM) OTS price $1.75

Westinghouse Electric Corp., Elmira, N. Y.
INSTANT STARTING HALF-WAVE RECTIFIER (TUBE TYPE WX-4222).
Rept. for 6 Mar 58-7 Feb 61,
by Joel H. Fink. July 61, 68p. incl. illus. tables.
(Contract AF 33(600)38881, Proj. no. 4156)
(WADD-TR 61-130) Unclassified report

DESCRIPTORS: (*Cold cathode tubes, *Half wave rectifiers, *Rectifiers, Design, High altitude.) (Cold cathode tubes, Tests, Life expectancy, Materials, Resistance.)

Problems encountered in designing and fabricating a cold cathode, high voltage rectifier for high temperature application are discussed. The final tube design is shown to be capable of operation in a wide range of ambient conditions, but the tube life was found to be limited by sputtering and gas clean-up. The general conclusions drawn from this work are that new, high temperature, high resistance materials are needed, as well as further fundamental investigations into the phenomena of gas sputtering and clean-up. (Author)

AD-267 413 Div. 8, 26
(TISTE/CRJ) OTS price $3.60

Hamilton Standard Div., United Aircraft Corp., Windsor Locks, Conn.
MODULAR INTERCONNECTIONS FOR MICRO-ASSEMBLIES. PHASE II.
Quarterly progress rept. no. 1, 1 June-30 Aug 61, by Robert H. Homstead. 30 Aug 61, 34p. incl. illus. (Rept. no. 4)
(Contract DA 36-039-sc-87301)
Unclassified report

DESCRIPTORS: (*Miniature electronic equipment, *Subminiature electronic equipment, Reliability, Materials, Design, Tests, Resistance, Vibration, Shock resistance, Manufacturing methods.) (Electronic equipment, *Electronic circuits, Electron beams, Welding, Aluminum compounds, Glass, Oxides, Machining.)

Research concerns the establishment of interconnecting systems to effect the integration of electronic parts into reliable equipment of minimum possible size. Efforts are divided into 2 tasks: Task A calls for the development of a reliable type of electron beam welded micro-assembly consisting of glass or alumina substrates stacked vertically and interconnected by conductor ribbons with a termination density of 1600 terminations per square inch on each side of the four sides of a micro-assembly. Task C calls for a study of the feasibility of cutting discrete terminals on the edge and faces of a substrate. (Author)

AD-267 421 Div. 8, 25
(TISTM/EJH) OTS price $1.60

Hughes Research Labs., Malibu, Calif.
STUDY OF BOMBARDMENT-INDUCED-CONDUCTIVITY MATERIALS.
Interim scientific rept. no. 4, 15 July-14 Nov 61,
by N. H. Lehrer. 14 Nov 61, 14p. incl. illus.
(Contract AF 33(616)7563)
Unclassified report

DESCRIPTORS: (*Storage tubes, *Display systems, *Thin films, *Dielectric films, Films, Zinc compounds, Sulfides, *Electron bombardment, Ion bombardment, Conductivity, Processing, Heat treatment, Crystals, Growth.) (X-ray diffraction analysis, Electron microscopy.)

Emphasis was on measurment of crystal size in thin films of cubic zinc sulfide to confirm whether increased size could be correlated with higher values of the conduction ratio. Two methods for determining the crystal size were investigated: electron microscope studies and x-ray diffraction photographs. While observation of the zinc sulfide surface structure by means of the electron microscope indicated a small and irregular grain size, probably 100 to 300 A in diameter, changes in crystal size as a result of thermal processing could not be readily determined. Qualitative estimates of the crystal sizes were sought by studying the line widths of the x-ray diffraction patterns taken on zinc sulfide specimens which received different thermal processing. Comparison of these x-ray diffraction patterns indicated a definite increase in crystal size with increase in processing temperature. (Author)

AD-267 435 Div. 8
(TISTE/CRJ) OTS price $2.75

Texas Instruments, Inc., Dallas.
STATIC COMMUTATOR.
Rept. for 4 Feb 60-31 Mar 61,
by R. E. Crossman, J. D. Thompson, and C. R. Thorpe. Apr 61, 115p. incl. illus. tables.
(Contract AF 33(616)7085, Proj. 4159)
(ASD TR 61-117) Unclassified report

DESCRIPTORS: (*Electronic commutators, *Electronic switches, *Switching circuits, *Analog-to-digital converters, Theory, Analysis, Design.) (Electronic circuits, Transistors, Radiofrequency amplifiers, Triggered gates, Pulse generators, Discriminators.)

A basic developmental program was completed to advance the state of the art in static commutation systems to be used in conjunction with telemetry systems in high speed aircraft, missiles, and space vehicles/satellites. The techniques of low-level electronic commutation, amplification, and high-speed analog-to-digital conversion of the commutated signals are discussed including both theoretical and experimental analysis. The low-level electronic switching is from 0 to 5 millivolts at a sampling rate of 100 kc. The analog-to-digital conversion has a 1-mc bit rate and 7-bit quantization precision. Techniques of accomplishing these functions with transistor circuitry are discussed. Different functions are presented and techniques for matching and selecting transistors for the low-level commutation are given. A discussion of the experimental model for the demonstration of these techniques is also presented. Techniques of analog-to-digital conversion using avalanche transistors are discussed. A theoretical and experimental analysis of thermal electric (Peltier) temperature control for the critical circuitry is experimentally and theoretically analyzed. (Author)

AD-267 459 Div. 8, 15
(TISTP/MFA) OTS price $10.50

Electronics Research Lab., Illinois Inst. of Tech., Chicago.
NEW CONCEPTS IN TRANSMISSION LINES.
Rept. for Sep 59-Dec 60 on New Concepts in Transmission Lines,
by George I. Cohn, Jayantilal G. Shah and Erwin W. Weber. Mar 61, 121p. incl. illus. tables.
(Contract AF 33(616)6761, Proj. 4156)
(WADD TR 61-51) Unclassified report

DESCRIPTORS: (*Transmission lines, Electromagnetic waves, Wave transmission, *Waveguides, Dielectrics.) (Design and Analysis, Attenuation, Reliability, Volume, Electric power production, Energy.) (Partial differential equation, Integrals, Integration.) (Experimental data, Tables.)

The possibility is investigated of transmission of electromagnetic energy by systems that are: lighter in weight, smaller in volume, more flexible, and more efficient than the techniques in use at the present time. (Author)

AD-267 482 Div. 8, 25
(TISTC/CCD) OTS price $1.60

Electrical Engineering Research Lab., U. of Texas, Austin.
RESEARCH ON MILLIMETER WAVE PROPAGATION AT HIGH

ALTITUDES.
Quarterly engineering rept. no. 1, 1 Sep-30 Nov 61,
30 Nov 61, 8p. illus.
(Contract AF 33(657)7333, Proj. 1002)
(ARPA Order no. 216-61) Unclassified report

DESCRIPTORS: (*Microwave spectroscopy, Instrumentation, Tests, Reflex klystrons, Water vapor, Oxygen.) (*Radiometers, Atmospheric refraction, Attenuation, *Microwaves, Extremely high frequency.) (High altitude, Propagation, Microwaves, Tests, Instrumentation, Design, Absorption.)

Research activities are concerned with: (1) laboratory microwave spectroscopy measurements of the shape and intensity of oxygen absorption lines in the 58-62 kmc frequency interval, (2) total atmospheric absorption measurements at various frequencies in the above interval using solar radiometric techniques, and (3) instrumentation design and development for the measurement of absorption as a function of elevation. (Author)

AD-267 493 Div. 8
(TISTE/CDM) OTS price $10.50

Hoffman Electronics Corp., El Monte, Calif.
TEMPERATURE INSENSITIVE TRANSISTOR.
Quarterly rept. no. 1, 15 May-15 Aug 61,
by John Spanos and R. Epple. 15 Aug 61, 1v.
incl. illus. 19 refs.
(Contract DA 36-039-sc-87276)
Unclassified report

DESCRIPTORS: (*Transistors, Temperature, Sensitivity, Theory, Design.) (Mathematical analysis, Electronic circuits, Tests, Diodes.)

A study was undertaken of the problems associated with the design and fabrication of practical transistors which are relatively insensitive to changes of temperature over the temperature range 0 - 75 C. The major emphasis was to explore the theoretical design aspects of the problem, select an approach, and substantiate the design by actual construction of twelve devices. The problem of h(FE) temperature compensation was studied by examination of the fundamental physical parameters affecting h(FE). Variable emitter periphery, Fletcher effect, parallel transistor, and diode-transistor effects were considered. Both lumped and distributed device concepts were evolved for design approaches. Preliminary tests of design concepts were achieved by circuit analogues. (Author)

AD-267 507 Div. 8, 25
(TISTP/MFA) OTS price $1.50

Electronics Research Lab., U. of Calif., Berkeley.
ELECTRON PHYSICS OF TRAVELING WAVE TUBE DEVICES.
Rept. on Research on Physical Phenomena Affecting the Characteristics of Electronic Components, by J. R. Whinnery, C. Susskind and others.
Apr 61, 50p. incl. illus.
(Contract AF 33(616)6139, Proj. 4150)
(ASD TR 61-75) Unclassified report

DESCRIPTORS: (*Traveling wave tubes, Backward-wave amplifiers, *Electron beams, Electron tubes, Oscillators, Microwave amplifiers, Design.) (Plasma physics, Wave transmission, Space charges, Ferrites.) (Mathematical analysis, Computers, Harmonic analysis, Partial differential equations.)

A brief description and important conclusions are given on work done at the Electronics Research Laboratory of the University of California for the Wright Air Development Division during the period December 15, 1959, through December 15, 1960. The work includes theoretical and experimental studies on high-temperature plasmas and the containment thereof, electron beams, fast-wave interaction with electron streams, solid-state and electron-beam parametric amplifiers, backward-wave interaction with waves on a ferrite rod or in plasmas, large-signal effects in traveling-wave tubes, and novel fast space-charge wave devices. (Author)

AD-267 513 Div. 8
(TISTP/GW) OTS price $2.60

Case Inst. of Tech., Cleveland, Ohio.
(No title).
Quarterly progress rept. 1 Apr-30 June 61.
30 June 61, 16p. (Scientific rept. no. 26)
(Contract AF 19(604)3887)
(AFCRL-788) Unclassified report

DESCRIPTORS: (*Electromagnetic waves, Diffraction, Ferrites, *Antennas, Design, *Dielectrics, Reflectors.) (*Electrical networks, Synthesis, Real variables, Matrix algebra.)

A synthesis procedure is devised for an n part immittance function which is patterned after the Bott Duffin synthesis procedure. (Author)

AD-267 540 Div. 8, 25
(TISTE/CDM) OTS price $18.00

Sumitomo Electric Industries, Ltd., Osaka (Japan).
NEW CONCEPTS FOR RF TRANSMISSION LINES.
Rept. on New Concepts for RF Transmission Lines, by M. Sugi, T. Nakahara, and N. Kurauchi.
Feb 61, 264p. incl. illus. tables, 10 refs.
(Contract AF 62(531)1591, Proj. 4156)
(WADD TR 61-22) Unclassified report

DESCRIPTORS: (*Transmission lines, Radiofrequency, Ultra high frequency, Superhigh frequency, Design, *Wave transmission.) (*Coaxial cables, *Waveguides, Dielectrics, Electromagnetic shielding, Theory, Mathematical analysis.)

A description is given of 4 new types of RF transmission lines for satisfactory use in the frequency band of 1 to 10 gc, with regard to bandwidth; low-loss, flexibility, and small size and weight. Four new RF transmission lines are recommended, based on 6 advanced concepts. The RF transmission lines are: (1) special coaxial cable for 1 - 3 gc use, (2) flat shielded X-guide for 3 - 7 gc use, (3) higher mode suppressed shielded X-guide for 7 - 10 gc use, and (4) balloon type O-guide (gas-filled thin dielectric pipe) for long distance communication use. The advanced concepts are: (1) the thin dielectric membrane surface wave transmission concept, (2) the double-layer thin dielectric membrane surface wave transmission concept, (3) the shielded dielectric waveguide concept, (4) higher mode suppression by using an anisotropic conductor, (5) the multi-layer stranded conductor concept, and (6) the transposed multi-layer conductor concept. The 4 lines and the 6 concepts are theorized in detail. Some experiments with the X-guide are given in order to verify the theoretical analysis. (Author)

AD-267 543 Div. 8, 6
(TISTW/RD) OTS price $15.00

Smyth Research Associates, San Diego, Calif.
EXPERIMENTAL STUDIES OF E REGION FIELD ALIGNED SCATTERING AT VHF.
Final engineering rept.,
by J. L. Heritage, W. J. Fay, and E. D. Bowen.
July 61, 73p. illus., 13 refs. (Rept. no. SRA-173, pt. 1)
(Contract AF 30(602)1624)
(RADC TR 61-224A) Unclassified report

DESCRIPTORS: (Wave transmission, Radar transmitters, Very high frequency, *Radar signals.) (Radio waves, *Scattering from Ionosphere, Very high frequency, Radar signals, Ionospheric propagation.) (Radar reflection from Meteors, Measurement, Scattering, Magnetic fields, Correlation techniques.)

Experimental research brought to light many characteristics of the E region magnetic field aligned scatter mode found at VHF, named HE scatter. At 200 megacycles, data was gathered over the Laredo-Borrego path for diurnal and seasonal comparison with other geophysical phenomena. Two forms of HE scatter revealed a preference in height of origin for the 100 to 110 Km region. The burst form correlates well diurnally and seasonally with sporadic meteor influx. Other detailed observations left little doubt that the burst form of H scatter is the direct result of scattering from meteoric electrons which take on a magnetic field aligned fine structure when released in the proper height interval. The long lasting H scatter signals occurred infrequently and showed something in common with a form of sporadic E. Maximum oblique incidence greatly enhanced the H scatter duty cycle which degenerated to a very small value at backscatter. (Author)

AD-267 544 Div. 8
(TISTE/CRJ) OTS price $9.10

Smyth Research Associates, San Diego, Calif.
SHIELD METHOD FOR SOLUTION OF GEOMETRIC PROBLEMS INVOLVING REFLECTION FROM FIELD ALIGNED IONIZATION. VOLUME I.
Special rept.,
by Steven Weisbrod and Lee A. Morgan. Feb 61, 21p. illus. (Rept. no. SRA-173, pt. 2, Vol 1)
(Contract AF 30(602)1624)
(RADC TR 61-224B) Unclassified report

DESCRIPTORS: (*Radio transmission, Wave transmission, *Electromagnetic wave reflections, Radio waves, Radio signals, Terrestrial magnetism, Propagation, Scattering, Reflection, Mathematical analysis.) *Radio charts.

The Shield Method for the solution of geometric problems of transmission paths involving specular or arbitrarily off-specular reflection from field aligned ionization, was developed to meet the urgent need for the solution of such problems without resorting to electronic computers or many hours of computations. The method is rapid, accurate, and easy to apply. It is valid for all antenna beam orientations in any part of the world. It is applicable to monostatic, bistatic and polystatic transmission paths. The method involves the use of charts which were named shields. Since these charts represent physical entities rather than mathematical abstractions, visual inspection enables the user to immediately obtain a feeling for the effect that a change in various parameters would have on the magnetic geometry. Detailed descriptions of the method, its application to certain specific problems, and a family of shields for the most common reflection height of 110 Km, at 1 degree increments of geomagnetic latitude are presented. Volume II (AD-267 545) contains shields for reflection heights of 75, 90, 100, 120, 150, 200, 300, and 400 Km at 5 degree increments of geomagnetic latitude. (Author)

AD-267 545 Div. 8
(TISTE/CRJ) OTS price $9.60

Smyth Research Associates, San Diego, Calif.
SHIELD METHOD FOR SOLUTION OF GEOMETRIC PROBLEMS INVOLVING REFLECTION FROM FIELD ALIGNED IONIZATION. VOLUME II.
Special rept.,
by Steven Weisbrod and Lee A. Morgan. Feb 61, 114p. incl. illus. (Rept. no. SRA-173, pt. 2, vol. 2)
(Contract AF 30(602)1624)
(RADC TR 61-224C) Unclassified report

DESCRIPTORS: (*Radio transmission, Wave transmission, Electromagnetic wave reflections, Radio waves, Radio signals, Terrestrial magnetism, Propagation, Scattering, Reflection.) *Radio charts.

AD-267 553 Div. 8, 14
(TISTE/CDM) OTS price $13.50

Rutgers U. Coll. of Engineering, New Brunswick, N. J.
HARMONIC GENERATION AT MILLIMETER WAVELENGTHS.
Final technical rept. 1 Feb 60-31 Aug 61,
by Robert G. Pecina. Oct 61, 115p. illus. 81 refs.
(Contract AF 49(638)554)
(AFOSR-1532) Unclassified report

DESCRIPTORS: (*Frequency multipliers, Radiofrequency generators, Microwaves, Microwave frequency, Superhigh frequency, Nonlinear systems, Design.) (*Microwave oscillators, Ferroelectric crystals, Dielectric properties.) (*Dielectrics, *Ceramic materials, *Ferroelectricity, Tests, Measurement.) (Ferroelectric materials, Barium compounds, Strontium compounds, Titanates.) (Test equipment, Test methods, Waveguides, Coaxial cables, Transmission lines.)

A study was conducted of methods of generating millimeter and submillimeter wavelength radiation by means of nonlinear harmonic generators. Generators in which the nonlinearity derives from a bulk property such as a nonlinear permittivity or permeability are of primary interest, because of their potential for operation at high power levels. The dependence of the complex dielectric constant of several polycrystalline ferroelectric ceramics upon an applied dc electric bias field over the frequency range from 3.0 to 9.5 kmc was determined. Bias fields of 0, 5 and 10 kv/cm were employed. The ceramic ferroelectrics investigated were barium - strontium titanate mixtures with and without small percentages of Fe_2O_3 and Ni. An admittance type of measurement was selected to measure the relative complex dielectric constant. In this method the complex dielectric constant of a material is related to a measured admittance. The complete design of the experimental apparatus is given and the limitations of the measuring technique are evaluated. (Author)

AD-267 699 Div. 8, 6
(TISTE/CDM) OTS price $1.10

Radiation, Inc., Melbourne, Fla.
TELEMETRY TRANSDUCER HANDBOOK.
Monthly progress rept. no. 4, 15 Aug-15 Sep 61,
by H. F. Fisher, Jr. 21 Sep 61, 4p.
(Contract AF 33(616)8309, Proj. 4107)
Unclassified report

DESCRIPTORS: (*Telemeter systems, *Transducers, *Handbooks, Standards.)

Work was continued on up-dating and expanding the Telemetry Transducer Handbook which was recently prepared by Radiation, Inc., for the Aeronautical Systems Division. (Author)

AD-267 710 Div. 8, 25
(TISTE/CRJ) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command,
Wright-Patterson Air Force Base, Ohio.
A DEVICE FOR CHANGING THE DIRECTION OF SURFACE WAVES,
by L. P. Strelkova. 22 Nov 61, 2p. incl. illus.
(Trans. no. FTD-TT-61-211 of Byulleten' Izobreteniy, No. 18:25-26, 1960)
Unclassified report

DESCRIPTORS: (*Transmission lines, Wire, *Wave transmission, *Radio transmission.) (Electromagnetic waves, Propagation, Refraction.) (*Prisms (Optics), Dielectrics, Refractive properties.)

This device for measuring the direction of surface waves propagated along a single wire has the following special feature: to increase the efficiency of the transmission line, the wire that conducts the surface wave is passed, at its bend points, through a refracting dielectric prism. (Author)

AD-267 715 Div. 8
(TISTW/RD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command,
Wright-Patterson Air Force Base, Ohio.
ESTIMATING THE RELIABILITY OF AUTOMATION SYSTEMS FROM THE RESULTS OF TESTS OF AN INCOMPLETE APPARATUS STRUCTURE,
by S. M. Kuznetsov. 21 Nov 61, 17p. incl. illus.
(Trans no. FTD-TT-61-199 of Avtomatika i Telemekhanika 22:1108-1116)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) *Automation, *Reliability, Failure (Mechanics), Probability, Statistical analysis, Statistical distributions.

A method of estimating the reliability of systems from the results of tests of an incomplete apparatus structure is considered. The dependence of the estimate error on the structure of the system and the ratio between the volumes of the groups of elements contained in the tested and nontested devices are established. (Author)

AD-267 717 Div. 8
(TISTW/RD) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command,
Wright-Patterson Air Force Base, Ohio.
NEWS OF THE ACADEMY OF SCIENCES OF THE USSR, DEPARTMENT OF TECHNICAL SCIENCES, POWER ENGINEERING AND AUTOMATION (SELECTED ARTICLES).
1 Nov 61, 12p. incl. illus. (Trans no. FTD-TT-61-141 of Izvestiya Akademii Nauk SSSR, Otn, Energetika i Avtomatika, Issue no. 2:205-209, 1960)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Control systems, *Reliability, Maintenance, *Automation, Failure (Mechanics), Statistical analysis.) (Amplifiers, Radiofrequency amplifiers, Automatic volume control, Reliability, Feedback, Feedback amplifiers.)

Contents:
Problem of securing reliable operation of a control installation
On the reliability of an amplifier with automatic amplification

AD-267 759 Div. 8
(TISTE/NTM) OTS price $1.10

Radio Corp. of America, Lancaster, Pa.
IMAGE INTENSIFIER ISOCON FEASIBILITY STUDY.
Interim engineering rept. 1 June-30 Nov 61,
by R. E. Hoffman. 4 Dec 61, 4p. illus.
(Contract AF 33(616)7696)
Unclassified report

DESCRIPTORS: (*Image intensifiers (Electronics), *Image tubes, Electron guns, Electrodes, Focusing, Design.) (Electron tubes, Targets, Thin films, Magnesium compounds, Aluminum compounds, Oxides, Nickel, Glass, Signal-to-noise ratio, Electron beams, Errors, Tests.)

Image intensifier isocons were built to test glass targets, magnesium oxide targets and aluminum oxide-nickel plug targets. Two different glasses were used, one a high resistivity glass used on previous image intensifier orthicons, the other a lead glass used for image orthicon targets. The tube with the high resistivity glass target, when operated in the orthicon mode performed on a par with standard intensifier orthicons with the same target. The performance of these tubes indicates the need for an extremely smooth, fine grained surface on the scanned side of the isocon target. The ability of the present intensifier isocon to present low light level information appears to be limited mainly by the background imperfections in the target, phosphor screen, intensifier coupling element and photosurface rather than the electron beam noise. (Author)

AD-267 767 Div. 8
(TISTE/NTM) OTS price $9.10

Kearfott Div., General Precision, Inc.,
Little Falls, N. J.
BROADBAND ANTENNA STUDY PROGRAM.
Rept. on Phase 1, 6 Apr-5 Aug 61,
by Lester S. Pearlman, Paul Gianas and Peter K. Baker. 5 Aug 61, 105p. incl. illus. 106 refs.
(Contract NOm-7-2183)
Unclassified report

DESCRIPTORS: (*Antennas, Broadband, Design.) (*Conical antennas, Antenna hardware, *Dipole antennas, *Loop antennas, *Biconical antennas, *Discone antennas, *Helical antennas, Polarization, Reduction, Ferrites, Impedance, Dielectrics, Bibliography.)

Efforts are being made to determine approaches and designs to provide the Marine Corps with broadband antennas reduced in size and capable of simple, rapid, field installation. Provision is also made for concurrent continued research to determine feasibility of possible advanced breakthrough solutions. Technical specifications include one kilowatt input, directionality and broadband operation over a range of at least 6-30 mc and ultimately of 2-100 mc. A review of the present state-of-the-art and future directions in broadband antenna development is included. Areas for continued development or investigation are described, some for longer term feasibility determination, others for more immediate development of hardware. (Author)

AD-267 784 Div. 8, 25, 26
(TISTE/NTM) OTS price $1.10

Piezo Crystal Co., Carlisle, Pa.
PRODUCTION ENGINEERING MEASURE X-Y FLEXURE MODE CRYSTAL UNITS CR(XM-32)/U, CR(XM-33)/U, CR(XM-34)/U, CR(XM-35)/U.
Combined quarterly repts. 25 Dec 60-24 July 61. 24 July 61, 6p.
(Contract DA 36-039-sc-85943)
Unclassified report

DESCRIPTORS: (*Crystal oscillators, Communication equipment, Oscillator circuits, *Quartz crystals, Crystals, Crystal holders, *Manufacturing methods, Industrial production, Production, Military requirements, Specifications, Processing, Plating, Electroplating, Nickel plating, Silver plating.)

Research was concerned with the surface finish that was obtained from using a 400 grit resinoid bonded wheel installed on a Norton vertical spindle surface grinder. Though the faces appeared polished when the table feed was very slow and the amount being removed was minimal, the surfaces still had a streaked appearance when viewed in glancing incident light. Further experiments with a finer grit wheel resulted in what was felt to be the best diamond finish obtainable. When the diamond edged units were processed the resistance of the surface plating was higher than anticipated. The evaporated silver layer was made heavy and an electroplated nickel overlay was used to achieve low dc resistance. Chemical deposition of silver resulted in good plating when measured by dc resistance. (Author)

AD-267 831 Div. 8
(TISTE/CDM) OTS price $2.60

Sperry Gyroscope Co., Great Neck, N. Y.
SHALLOW DONOR EMISSION CATHODE STUDY.
Quarterly technical note no. 1, 24 Apr-13 July 61,
by J. E. McLinden and J. K. Gorman. Aug 61, 23p. incl. illus. 20 refs. (Rept. no. NA-8250-8278-1)
(Contract AF 30(602)2495, Proj. 5573)
(RADC TN 61-235) Unclassified report

DESCRIPTORS: (*Cathodes (Electron tubes), *Thermionic emission, Barium compounds, Oxides, Rare earths, Impurities.) (Semiconductors, Conductivity, Ions, Electrons.) (Thermionic emission, Photoemission, Measurement, Test methods, Tests, Mathematical analysis.) (Design, *Electron tubes.)

Work was begun on the development of a low-work-function thermionic emitter by introducing shallow donor states into matrices having a low electron affinity. The preliminary objective was to demonstrate experimentally the introduction of controlled concentrations of shallow states into an appropriate matrix. Special consideration was given to the control of extraneous surface effects, evaporation, poisoning, and other deleterious conditions. The alkaline earth oxides, especially BaO, appeared to be the most likely materials for use as a matrix. The calculations, which have been performed, indicated that a reasonable approach to the incorporation of shallow donors into BaO was the substitution of a trivalent rare earth ion for Ba(+2), followed by a chemical reduction of the system. The elucidation of the donor properties of various additives could probably best be made through photoemission and Hall coefficient measurements in addition to the direct study of thermionic emission. (Author)

AD-267 839 Div. 8
(TISTE/CRJ) OTS price $12.00

Electrical Engineering Research Lab., U. of Illinois, Urbana.
ANALYSIS OF DYNAMIC CROSSED-FIELD ELECTRON MULTIPLICATION,
by O. L. Gaddy and D. F. Holshouser. 1961. 158p. incl. illus. tables, 12 refs. (Technical note no. 1)
(Contract AF 49(638)556, Proj. 9768)
(AFOSR-1693) Unclassified report

DESCRIPTORS: (*Electron multipliers, Analysis, Electric fields, High frequency, Magnetic fields.) (Electrons, Motion, Velocity, Equations, Secondary emission.) (*Photo multipliers, Microwave amplifiers, Frequency multipliers, Pulse generators, Doppler radar.)

The general solution for single electron motion in alternating uniform electric fields and crossed steady uniform magnetic fields is presented. Several aspects of the motion are discussed when the electrons are assumed to have zero initial velocities, such as phase focusing, arrival energy, etc. The case when initial electron velocity cannot be ignored is considered, and the effects of initial velocities and velocity distribution is investigated. Some practical considerations, such as gain and power requirements, are investigated. A few of the possible applications in addition to high frequency response photomultiplier are discussed. (Author)

AD-267 841 Div. 8
(TISTE/CRJ) OTS price $4.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
STRUCTURE OF SWITCHING NETS,
by Lars Lofgren. 31 Oct 61, 44p. incl. illus. tables (Technical rept. no. 7)
(Contract Nonr-183421, Proj. NR 049-123)
Unclassified report

DESCRIPTORS: (*Switching circuits, *Electrical networks, Combinatorial analysis, Mathematical analysis, Algebra, Theory.)

Switching nets, or combinatorial nets, are

usually classified as contact nets, gate nets or hybrid nets. The question whether there exists more than 2 uniform switching structures was investigated, with the result that there are only 2, the g-structure and the c-structure. The c-structure is a degenerate case of a g-structure, namely one where all gates contain only wires. The physical dimensions of the switch-states which permit c-structures are specified in terms of structural properties of measurable quantities. It is shown that the states of a c-structure must be 2-valued and that g-structures exist for any many valuedness of the states. This theory of switching nets is developed with elementary concepts from set-theory, graph-theory, and the theory for measurable physical quantities. (Author)

AD-267 842 Div. 8, 7, 26
(TISTP/WH) OTS price $7.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
QUALITATIVE LIMITS FOR AUTOMATIC ERROR CORRECTION-SELF-REPAIR,
by Lars Lofgren. 21 June 61, 70p. incl. illus. 17 refs. (Technical rept. no. 6)
(Contract Nonr-183421, Proj. NR 049-123)
Unclassified report

DESCRIPTORS: (*Errors, Corrections, *Automatic, Time, Sequences, *Electronic systems, *Electrical networks, *Computers.) (Probability, Automation, Cybernetics, Analysis, Reliability, Communication systems, Circuits, Theory, Electric relays, Oscillation, Synchronizers, Design, Measurement.) (Special functions, Mathematical analysis, Measure theory, Determinants, Sequential analysis, Inequalities, Algebra.) Noise.

AD-267 843 Div. 8, 25
(TISTE/CRJ) OTS price $10.10

Electrical Engineering Research Lab., U. of Illinois, Urbana.
MEGAVOLT ELECTRONICS, SUB-MILLIMETER WAVE RESEARCH.
Annual rept., 1 Mar 60-28 Feb 61.
1 Mar 61, 113p. incl. illus. table.
(Contract AF 33(616)7043, Proj. 5237)
Unclassified report

DESCRIPTORS: (*Cerenkov radiation, Ferrites, Dielectrics, *Plasma physics, Mathematical analysis.) (*Radiofrequency generators, Microwaves, Electromagnetic waves, Sources.) (*Electron accelerators, S band, Numerical analysis.) (*Electronics, *Electron optics.)

Research on the Cerenkov radiation approach to the millimeter and submillimeter generation problem is described. The method involves a combination of megavolt electronics and physical optics type techniques. A scalar dielectric Cerenkov coupler operating at 8.31 millimeters wavelength produced 58 milliwatts per centimeters using a drive current of 43 milliamperes. The analysis and preliminary design of Cerenkov experiments in tensor media (ferrites, plasmas) is presented which shows promise of producing upwards of 100 watts with a 10 milliampere beam. Initial numerical analysis for a relativistic electron bunching accelerator (Rebatron) operating above 3 kmc is presented. (Author)

AD-267 852 Div. 8, 2
(TISTE/NTM) OTS price $3.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
IONOSPHERIC RESEARCH AND PROPAGATION STUDIES.
Quarterly progress rept. no. 5, 1 July-30 Sep 61,
by H. D. Webb. 30 Sep 61, 36p. incl. illus. table.
(Contract DA 36-039-sc-85173, Proj. 3A99-20-001-04)
Unclassified report

DESCRIPTORS: (*Ionospheric propagation, *Radio astronomy, *Electromagnetic wave reflections, Radio transmission.) (Radio waves, *Radio signals, Moon, Reflection, Polarization, Scattering, Wave transmission.) (*Parabolic antennas, Transmission lines, Coaxial cables, Reflectors, Standing wave ratios, Impedance, Radiofrequency.) (Ionosphere, Electrons, Density.)

A new wide band log periodic antenna feed is described which has improved impedance characteristics compared to older log periodic feeds. The feed is fed from the front with a coaxial cable which reaches the feed along the parabolic axis. Some data for the feed, and for the antenna with the new feed, are given. Moon reflected signals were received from July 10 to 21 and from August 7 to 10 on 150.6 mc, and on August 11 on 413.2 mc. The signals were received with the antenna polarization rotating. The nulls were calibrated in relative polarization angle and time, and plots of the polarization change are shown. One set of data was taken during the solar flare of July 11. The relative change of electron content was calculated from some of the data. A method of studying signals received by scattering is presented. This method makes use of the frequency of the signal received by scattering as compared to the moon reflected signal with the Doppler frequency subtracted out. (Author)

AD-267 870 Div. 8
(TISTE/NTM) OTS price $5.60

General Electric Co., Owensboro, Ky.
A STUDY OF FILMS IN ELECTRON TUBES.
Interim quarterly technical rept. no. 6, 1 Aug-1 Nov 61,
by J. W. Hall, II. 1 Nov 61. 50p. incl. tables, 103 refs.
(Contract NObsr-81225)
Unclassified report

DESCRIPTORS: (*Thin films, *Electron tubes, Analysis, Bibliography.) (Films, *Electron diffraction analysis, Neutron activation, Spectrographic analysis, Optical analysis, X-ray spectroscopy, Mass spectroscopy, Gases.) (Diodes, Triodes, Electronic circuits, Tests, Life expectancy.)

Methods of analysis and techniques to be used in analyzing the tubes of the random balance experiment are given. Life test data (regular dc and standby) recorded at the 500-hour period are also given. An abstracted bibliography is presented. (Author)

AD-267 880 Div. 8
(TISTE/CDM) OTS price $3.60

Norwegian Defence Research Establishment.
THE DICATRON-A MICROWAVE OSCILLATOR USING A HELIX RESONATOR,
by Tore Wessel-Berg. Aug 61, 23p. incl. illus.
(Technical note no. 5)
(Contract AF 61(052)264)
(RADC-TDR-61-294) Unclassified report

DESCRIPTORS: (*Microwave oscillators, *Cavity resonators, Design, Tests, Norway.) (Electron tubes, Electron beams, Helixes, Electric fields.) (Oscillators, Frequency modulation.)

A description is given of an experimental oscillator consisting essentially of a hollow electron beam interacting with the longitudinal electric field between 2 coupled concentric helices shorted at both ends, thus constituting a resonant cavity. The tube is normally operated under pulsed conditions at 950 volt and 75 ma beam current, and delivers peak output power of the order of 3 watts in the n=6 mode (3 wavelengths), which is the normal mode of operation. The oscillator can be frequency modulated much similar to a floating drift-tube klystron by applying a varying voltage to the resonator. Experimental results of power output and electronic tuning bandwidth are presented and compared with theory. (Author)

AD-267 881 Div. 8
(TISTE/NTM) OTS price $1.60

Norwegian Defence Research Establishment.
RESEARCH ON DISTRIBUTED CAVITY KLYSTRON OSCILLATOR.
Final rept.,
by Tore Wessel-Berg. Aug 61, 10p.
(Contract AF 61(052)264)
(RADC-TDR-61-295) Unclassified report

DESCRIPTORS: (*Klystrons, Microwave oscillators, Electron tube oscillators, *Cavity resonators, Helixes, Distribution, Design.) (Oscillators, Electron beams, Electromagnetic fields, Radiofrequency oscillators.)

The investigations were concerned with interaction of electron beams and electromagnetic fields over extended regions. Problems involving the conversion of kinetic beam power to electromagnetic power in interaction regions with various RF field distributions were analyzed in detail. Attention was devoted to the problem of synthesizing optimum field distributions with regard to power conversion. This was done generally at small signal level using an analysis including the effect of space-charge. At large signal level the optimization procedure is more difficult and has been carried through only for the generalized floating drift-tube klystron, involving a number of short interaction gaps separated by field-free drift regions. Experimental research activities on the subject of distributed oscillators were concerned with a type of oscillator incorporating a shorted-helix resonator, characterized by a sinusoidal field distribution. Results from the test of the tube and a comparison with theory are presented. (Author)

AD-267 894 Div. 8
(TISTE/NTM) OTS price $2.60

Electronics Research Lab., U. of Calif., Berkeley.
CORRELATION PROCESSES IN ANTENNA ARRAYS.
PART II,
by I. W. Linder. 13 June 61, 28p. incl. illus.
(Series no. 60, Issue no. 371)
(Contract AF 49(638)1043)
(AFOSR-1348) Unclassified report

DESCRIPTORS: (*Antennas, *Coupled antennas, Correlation techniques.) (Antennas, Nonlinear differential equations, Linear systems, Nonlinear systems, Mathematical analysis, Noise, Voltage, Signal-to-noise ratio, Statistical analysis.)

Investigations concern the use of statistical correlation techniques in combining the voltages induced on the elements of a receiving antenna array. Analysis was made of the nonlinear processes in these arrays when both signal and distributed noise sources are present. The effect of distributed noise was analyzed, resulting in an expression for element spacing which will minimize the undesired noise voltage induced on the array. Channel capacities of linear and of nonlinear arrays were then compared. These results are employed to construct nonlinear arrays which will optimize the S/N or will provide a minimum beamwidth in the antenna directional pattern. (Author)

AD-267 895 Div. 8, 15
(TISTE/NTM) OTS price $5.60

Electronics Research Lab., U. of Calif., Berkeley.
STATISTICAL STUDY OF PULSE WIDTH MODULATED CONTROL SYSTEMS (I),
by S. C. Gupta and E. I. Jury. 12 Sep 61, 55p. incl. illus. tables, 48 refs. (Series no. 60, Issue no. 403)
(Contract AF 18(600)1521)
(AFOSR-1628) Unclassified report

DESCRIPTORS: (*Pulse modulation, Control systems, Automatic, *Pulse generators, Mathematical analysis, *Statistical processes, Numerical analysis, Statistical functions.)

Efforts concern a statistical study of pulse width modulated control systems. The pulse width modulator (PWM) was first considered for positive signals only. The output of this was then compared with the output of the approximate model where the PWM was replaced with a sampler, saturating nonlinear element and a hold circuit based on equal area approximation. An example was worked to show that there is little error involved by this approximation. Using this as the basis, the open loop case was worked out for Gaussian inputs. The results were tabulated and graphed. In the solution of the closed-loop system the difficulty of the calculation of the crosscorrelation function was overcome by making another approximation based on the separability property of Gaussian Process. This facilitates the whole problem and the relationship of output MSV to input MSV was graphed for a simple example. (Author)

AD-267 896 Div. 8, 25
(TISTM/TCG) OTS price $2.60

Electronics Research Lab., U. of Calif., Berkeley.
OPTICAL MASER BY THE METHOD OF ELECTRON EXCITATION,
by L. Lin. 27 Sep 61, 17p. incl. illus. 14 refs. (Series no. 60, Issue no. 407)
(Contract AF 49(638)1043)
(AFOSR-1639) Unclassified report

DESCRIPTORS: (*Masers, Microwave oscillators, Electrons, Excitation, Electron transitions, Mercury, Vapors, Atomic energy levels, Electromagnetic fields, Quantum statistics, Electron optics, Mathematical analysis.)

A method of achieving optical maser oscillation by electron excitation was investigated. In this scheme, atoms in the ground level, upon being collided by incident electrons, made transitions to excited levels. It was shown that maser oscillation is possible between 2 excited levels, if certain conditions are satisfied. A simple model was used for general analysis, and an Hg vapor system was utilized as an example. (Author)

AD-267 897 Div. 8
(TISTE/NTM) OTS price $1.60

Electronics Research Lab., U. of Calif., Berkeley.
CHARGE CONTROL ANALYSIS OF BASE STORAGE TIME IN A SATURATED TRANSISTOR.
Rept. on Integrated Circuits,
by L. O. Hill. 29 May 61, 11p. incl. illus.
(Series no. 60, Issue no. 358)
(Contract AF 33(616)7553, Proj. 4159)
(ASD TN 61-110) Unclassified report

DESCRIPTORS: (*Transistors, Electrodes, Electronic circuits, Mathematical analysis, Electron transitions, Theory, Electromagnetic theory.)

A modified charge control analysis was made of the excess carrier storage time in the base of a saturated transistor. The dominant natural frequency for the common-base and common-emitter configurations was found. This frequency, although differing in form from that obtained by Moll, is shown to be closely related to that result. (Author)

AD-267 898 Div. 8
(TISTE/CRJ) OTS price $2.60

Electronics Research Lab., U. of Calif., Berkeley.
A NOTE ON THE REVERSE-BIASED P-N JUNCTION AS A CIRCUIT ELEMENT.
Rept. on Integrated Circuits,
by L. O. Hill. 14 June 61, 15p. incl. illus.
8 refs. (Series no. 60, Issue no. 376)
(Contract AF 33(616)7553, Proj. 4159)
(ASD TN 61-111) Unclassified report

DESCRIPTORS: (*Coupling circuits, *Electronic circuits, *Resistors, Variable capacitors, Capacitors, Analysis.) (*Electrostatic capacitance, Voltage, Mathematical analysis, Applied mathematics.)

The large signal pulse response of a simple coupling circuit composed of a resistor and voltage dependent capacitor is analyzed. The rise and decay times of this circuit are shown to differ from each other. When this circuit is driven by a symmetrical rectangular pulse train, it is found that the steady-state average capacitor voltage depends on both the period and magnitude of the input voltage source. This variation in average capacitor voltage with period may lead to undesirable changes in the biasing and parameters of the associated active devices. (Author)

AD-267 899 Div. 8
(TISTE/CDM) OTS price $2.60

Electronics Research Lab., U. of Calif., Berkeley.
TAPERED RC NETWORKS FOR USE IN INTEGRATED FILTER CIRCUITS.
Rept. on Integrated Circuits,
by D. A. Hodges. 11 Aug 61, 23p. illus.
13 refs. (Series no. 60, Issue no. 390)
(Contract AF 33(616)7553, Proj. 4159)
(ASD TN 61-139) Unclassified report

DESCRIPTORS: (*Electrical networks, Resistance, Electrostatic capacitance, *Electronic circuits, Transistors, Distributed amplifiers, *Band-pass amplifiers.) (*Radiofrequency filters, Mathematical analysis, Partial differential equations, Circuits.)

Short-circuit admittance parameters were developed for an exponentially tapered single-path distributed RC network. Tapering has a considerable effect on the driving point admittance, but only a small effect on the transfer admittance. The properties of a bandstop or notch filter comprising a distributed RC line and a lumped capacitor were studied; it was found that the notch in the short-circuit current transfer ratio versus frequency plot is narrowed by grading the network. A bandpass amplifier using a single transistor with a notch filter as the frequency selective element was analyzed. The limits on the performance of such an amplifier are defined by the case with no finite load in which the transistor is assumed to be an ideal current amplifier. The performance of a bandpass amplifier using a practical transistor and a finite shunt load conductance was determined and plotted for several specific cases. The effects on amplifier performance of grading the distributed RC line were reduced as the load admittance was increased. (Author)

AD-267 928 Div. 8
(TISTE/CDM) OTS price $5.60

Library Services Section, Aerospace Information Div., Washington, D. C.
RADIO WAVE PROPAGATION.
Bibliography of USSR Publications (Monographs, Monographic Serials, and Periodicals) for 1958-1960.
7 Nov 61, 48p. (AID rept. 61-150)
Unclassified report

DESCRIPTORS: (USSR, *Bibliography, *Wave trahsmission, *Radio waves, *Electromagnetic waves, *Ionospheric propagation, Atmosphere, Propagation, *Radio transmission.)

A bibliography is presented based on USSR publications (monographs, monographic serials, and periodicals) for 1958-1960. It contains 261 entries divided into three parts and arranged alphabetically by authors within each part. Titles of monographs are given in Russian followed by an English translation. Annotations are provided when clarification is considered desirable. The entries are grouped under three headings: Propagation in general, Propagation in the troposphere, and Propagation in the ionosphere. (Author)

AD-267 956 Div. 8
(TISTE/CRJ) OTS price $10.50

Melpar, Inc., Falls Church, Va.
CALCULATION OF FREE-SPACE RADIATION CHARACTERISTICS OF HORN ANTENNAS AT SPURIOUS FREQUENCIES.

APPENDIX C.
Final rept.
May 61, 111p.
(Contract AF 30(602)2295)
(RADC TR 61-191B, vol. 2)
Unclassified report

DESCRIPTORS: (*Coupled antennas, Dipole antennas, Antennas, *Antenna horns, Radar antennas, *Antenna radiation patterns, Waveguides, Fourier analysis, Series.) (Coupling circuits, Antenna couplers, Waveguide couplers, Transmission lines, Coaxial cables, L band, Mathematical analysis.)

The analysis and development is described of mathematical tools for calculating the behavior of waveguide-coupled antennas operating at nondesign frequencies under the influence of higher-order modes. Specifically, equations are developed for horn antennas; however, the analysis and some of the equations can be directly applied to other waveguide structures. (Author)

AD-267 957 Div. 8, 7, 26
(TISTE/NTM) OTS price $1.60

McCoy Electronics Co., Mount Holly Springs, Pa.
INDUSTRIAL PREPAREDNESS MEASURE. MANUFACTURE OF GLASS HOLDER CRYSTAL UNITS CR-(XM-17)/U.
Combined progress rept., 1 Aug 60-30 Sep 61.
30 Sep 61, 11p. illus.
(Contract DA 36-039-sc-81269)
Unclassified report

DESCRIPTORS: (*Crystal holders, *Quartz crystals, Glass, Design, Mounting brackets, Seals, Soldered joints, Metals, Glass textiles.) (Crystals, Production, *Manufacturing methods, Industrial equipment, Industrial production.)

Research was continued on the manufacture of glass holder crystal units. Finding the proper crystal design and mounting straps capable of holding the crystal were the main problems encountered in work with the 800.000 kc crystal units. The 9,000 and 20,000 kc crystal units were fabricated, tested and are being prepared for submission. (Author)

AD-267 960 Div. 8
(TISTE/CRJ) OTS price $15.00

Melpar, Inc., Falls Church, Va.
MODEL TECHNIQUES FOR INTERFERENCE MEASUREMENTS.
Final rept. Apr 60-June 61,
by J. C. Pullara. July 61, 215p. incl. illus. tables.
(Contract AF 30(602)2295)
(RADC TR 61-191A, vol. 1)
Unclassified report

DESCRIPTORS: (*Antennas, *Radar interference, *Radio interference, Model tests, Measurement.) (*Dipole antennas, *Radar antennas, Antenna horns, Antenna couplers, *Antenna radiation patterns, Measurement, Test methods.)

Results are presented of a study of the feasibility of applying model techniques to the analysis and measurement of antenna interference characteristics. Initial emphasis was directed toward modeling free-space, far-field phenomena, although some effort was applied to site modeling. The techniques described are capable of modeling antennas for measurements in and outside their design bands. The most advantageous characteristics of RF, hydroacoustic, and optical modeling techniques were combined to form a modeling procedure operable in 4 phases. Operational details of each phase are discussed, and data are presented to demonstrate the degree of correlation which can be obtained between full-scale and model measurements. Preliminary data lead to the conclusion that the modeling procedure provides an economical, flexible, simple, and reasonably accurate tool applicable to antenna and site interference analysis. A theoretical investigation into the radiation characteristics of horn-type antennas at nondesign frequencies was also conducted. (Author)

AD-267 989 Div. 8
(TISTE/CRJ) OTS price $2.60

Norwegian Defence Research Establishment.
TRANSVERSE-FIELD COUPLERS FOR ELECTRON BEAMS,
by Tore Wessel-Berg. 3 July 61, 20p. (Technical note no. 1)
(Contract AF 61(052)531)
(RADC TDR 61-275) Unclassified report

DESCRIPTORS: (*Electron beams, *Electromagnetic waves, Wave transmission, Electron tubes, *Coupling circuits.) (*Electromagnetic theory, Electromagnetic waves, Electric fields, Magnetic fields, Polarization, Propagation.) (Electron tubes, Traveling wave tubes, *Klystrons, Cyclotrons.)

A theory of the electronic behavior of cavity couplers for transverse electron beam waves is presented. The excitation of a particular wave is determined by the Fourier transform of the appropriately polarized transverse RF electric field over the interaction length of the coupler, with propagation factor appropriate to the wave. Power relations are discussed using the kinetic power theorem for transverse waves. The theory is applied to a transverse klystron based on synchronous waves, and a brief discussion is given of its main characteristics. (Author)

AD-268 004 Div. 8
(TISTE/NTM) OTS price $6.60

Stanford Research Inst., Menlo Park, Calif.
INVESTIGATION OF A SQUARE-MESH WIRE-GRID MODIFIED-LUNEBURG-LENS ANTENNA,
by M. G. Andreasen and R. L. Tanner. Sep 61, 55p. incl. illus. 13 refs.
(Contract AF 19(604)8059)
(AFCRL-933) Unclassified report

DESCRIPTORS: (*Lens antennas, Design, Copper wire, Microwave equipment.) (Electromagnetic lenses, Antennas, Antenna horns, High frequency, Antenna radiation patterns, Measurement, Dielectric properties, Mathematical analysis.)

Research concerns the design, construction and measured performance of an experimental square-mesh wire-grid modified Luneburg lens antenna. This novel antenna shows great promise for many applications. The lens part consists of a ground plane above which is placed a circular square-mesh wire-grid whose distance from the ground plane is varied to achieve a focusing effect. The lens is loaded with a radial horn to obtain a high radiation efficiency. The lens antenna was tested with an omnidirectional feed and with a directional feed in a bandwidth of more than 2:1. The measured radiation patterns agree well with the theoretical patterns. With a simple directional feed, side-lobe levels of below -20 db were obtained. (Author)

Division 8 - ELECTRONICS AND ELECTRONIC EQUIPMENT

AD-268 006 Div. 8, 26
(TISTE/NTM) OTS price $1.60

Transitron Electronic Corp., Wakefield, Mass.
PRODUCTION ENGINEERING MEASURE ON SILICON HIGH FREQUENCY POWER TRANSISTOR.
Quarterly rept., 1 July-30 Sep 61,
by David O'Brien. 30 Sep 61, 14p. incl. illus. tables.
(Contract DA 36-039-sc-81286)
Unclassified report

DESCRIPTORS: (*Transistors, Silicon, High frequency, Production, *Manufacturing methods.) (Silicon, Processing, Diffusion, Phosphorus, Test methods.)

Work was directed at improving the Vcesat of the 5 watt 10 mc transistor. The results showed that a transistor with a N doped collector of 3 ohm bulk resistivity and 2 mils thick would have a Vcesat less than the specified 1.7-v, with Ic = 500 ma and Ib = 200 ma. Some transistors were produced with a low Vcesat but the techniques involved in producing large numbers of these transistors with a high yield have not been mastered. Work was carried out on improving the emitter and base contacts with a resulting higher yield from these operations. (Author)

AD-268 027 Div. 8
(TISTW/RD) OTS price $4.60

Armour Research Foundation, Chicago, Ill.
RFD ANTENNA TECHNIQUES SURVEY.
Quarterly rept. no. 1, 1 June-1 Sep 61,
by Peter Toulios. 28 Sep 61, 45p. incl. illus. tables, 13 refs. (Rept. no. 61-S-18020)
(Contract AF 30(602)2509, Proj. 5582)
(RADC TN 61-233) Unclassified report

DESCRIPTORS: *Antennas, Very low frequency, High frequency, Electrical properties, Tables, Naval equipment.

A study is being made to determine the state-of-the-art of VLF and HF antenna techniques, with particular regard to the types of structures used, radiation efficiency, frequency of operation, gain, polarization, bandwidth, beamwidth, side lobe, back lobe, power capability, mechanical limitations, real estate, installation maintenance and other pertinent design criteria. (Author)

AD-268 035 Div. 8, 14
(TISTM/TCG) OTS price $.75

Armour Research Foundation, Chicago, Ill.
RESEARCH AND DEVELOPMENT SERVICES LEADING TO THE CONTROL OF ELECTRICAL PROPERTIES OF MATERIALS FOR HIGH TEMPERATURE RADOMES.
Rept. on Applied Research in Electrical, Electronic, and Magnetic Materials,
by Leon M. Atlas and H. Henry Nakamura. Aug 61, 20p. incl. illus. tables, 13 refs.
(Contract AF 33(616)5929, Proj. 7371)
(WADC TR 59-300, pt. 3) Unclassified report

DESCRIPTORS: (*Radomes, High temperature research, *Ceramic materials, Electrical properties, Dielectric properties, Plasticity, Temperature, Production.) (Impurities, Aluminum compounds, Oxides, Additives, Barium compounds, Strontium compounds, Titanates.)

Pure aluminas and a commercial high purity product were hot-pressed in an Ar atmosphere. Densities in the range 3.85 to 3.97 g/cc were readily obtained at 1650 to 1750 C and 3000 to 3500 psi. Although the specimens were apparently rendered completely free of C by annealing in O at 1500 to 1700 C, their dissipation factors were much higher than for sintered disks made from the same powders. Compositions were formulated containing a titanate phase whose temperature variation of k' is negative. At a level of 14% SrTiO3, the k' of a titanate-alumina ceramic varied only 2.8% between 25 and 500 C at 10 to the 6th power c/s and 1.0% at 4 x 10 to the 9th power c/s as compared to 5.5 to 6.8% for high purity aluminas. The stable coexistence of Al2O3 and SrTiO3 on firing suggests a eutectic system which is located in the composition interval 65 to 70% SrTiO3, and near 1625 C. (Author)

AD-268 049 Div. 8
(TISTE/CRJ) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD FOR MEASURING SMALL AND LARGE COEFFICIENTS OF REFLECTIONS AT SUPER-HIGH FREQUENCIES,
by V. D. Kukush and V. G. Mikhaylik. 4 Dec 61, 3p. incl. illus. (Trans. no. FTD-TT-61-210 of Byulleten' Izobreteniy, Patent no. 131800, No. 18:24-25, 1960)
Unclassified report

DESCRIPTORS: (Superhigh frequency, Electromagnetic waves, Reflection, *Electromagnetic wave reflections, Measurement.) (*Standing wave ratios, Determination.) (*Waveguides, Traveling wave tubes, Cavity resonators.) (Translations, USSR, Technological intelligence.)

This method of measuring small (VSWR less than 1.1) and large (VSWR greater than 10) reflection coefficients on super-high frequencies has the following special feature: to decrease the difficulty in making measurements, the irregularity with a small VSWR is coupled to a traveling-wave resonator which has variable coupling to the waveguide, the irregularity with large VSWR is coupled to the main waveguide, and the VSWR of the irregularities is determined from the readings of the measurement line in the main waveguide and from the coefficient of the connection between the waveguide and the traveling-wave resonator when the latter is at resonance. (Author)

AD-268 051 Div. 8
(TISTE/CDM) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD FOR AUTOMATICALLY SETTING THE LIMITING LEVEL WHEN RECEIVING BINARY SIGNALS,
by L. I. Byalyy. 29 Nov 61, 2p. (Trans. no. FTD-TT-61-209 of Byulleten' Izobreteniy, No. 16, Patent no. 130929:17-18, 1960)
Unclassified report

DESCRIPTORS: (USSR, Technological intelligence, Translations.) (*Signal-to-noise ratio, *Radio signals, Sequences, Radio receivers, Errors, Data transmission systems.) (Noise generators, *Noise (Radar), *Noise (Radio).)

A method is proposed for automatically setting the limiting level when receiving binary signals, which will make it possible to decrease the probability of errors when receiving a binary train. The method consists in determining, by means of a functional converter, the required

value of the limiting level with respect to the given noise level and the average level of the received signal. A standard noise value is created by means of an AGC-controlled noise generator. (Author)

AD-268 068 Div. 8
(TISTE/CRJ) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD OF TUNING THE FREQUENCY CHARACTERISTICS OF POLARIZATION GRIDS,
by Yu. S. Bondartsev. 1 Dec 61, 2p. incl. illus. (Trans. no. FTD-TT-61-207 of Byulleten' Izobreteniy, Patent no. 130073, No. 14:20-21, 1960)
Unclassified report

DESCRIPTORS: (*Electrodes, *Polarization, Electric fields, Frequency, Tuning circuits.) (Translations, USSR, Technological intelligence.) Antennas.

The polarization sheet grids used in present-day antennas require constant polarization characteristics in the range of frequencies. Since the grid plates have finite thickness, there is a mutual reaction between the grid and the antenna, and the antenna has a complex surface shape, it is very difficult to calculate the grids to the required accuracy, and it is hard to tune the grids. The proposed method makes it possible to simplify the process and curtail the tuning time of the frequency characteristics of polarization grids. (Author)

AD-268 075 Div. 8
(TISTE/CRJ) OTS price $1.10

Centro Radioelettrico Sperimentale G. Marconi (Italy).
BACKSCATTER OF H.F. RADIO WAVES FROM COASTAL AND CONTINENTAL GROUND RELIEFS,
by I. Ranzi. 15 Apr 61, 6p. incl. illus. (Scientific note no. 4)
(Contract AF 61(052)139)
(AFCRL-911) Unclassified report

DESCRIPTORS: (High frequency, *Radio waves, Scattering, Ionospheric propagation, Propagation, Polarization, Radar echo areas.) (Beaches, Terrain, Ocean waves.) Italy.

Direct backscatter from coastal ground reliefs of HF radio waves coming from sea was experimentally investigated and compared with backscatter from continental ground reliefs. The former backscatter appears to depend on polarization since it is much stronger with horizontal polarization. The other conditions being the same, the backscatter of horizontally polarized radio waves from coastal reliefs is stronger than the one from continental reliefs. (Author)

AD-268 080 Div. 8
(TISTE/CW) OTS price $5.60

Diamond Ordnance Fuze Labs., Washington, D. C.
STATUS OF MICROMINIATURIZATION - JUNE 1961,
by Eleanor F. Horsey and Philip J. Franklin. 1 June 61, 61p. incl. illus. tables, 42 refs.
(DOFL rept. no. TR-951)
(Proj. 90292)
Unclassified report

DESCRIPTORS: (*Miniature electronic equipment, *Subminiature electronic equipment, *Printed circuits, Design, Preparation, Production.)

The status of microminiaturization is summarized under three headings: (1) assembly of pretested conventional or specially designed component parts, (2) printing or vapor deposition of multi-component assemblies on flat insulating substrates, and (3) preparation of complete circuits from a solid block of semiconductor material. Under the first heading, new developments include imitation 2D-type structures, and pelletized parts. Under the second heading, the evolution of the 2D thin-film type of construction into experimental circuits containing all thin-film passive parts is shown. The logical next step, preparation of circuits containing thin-film active as well as passive parts, is discussed. Under the third heading, new developments in integrated and functional circuits are presented. The trend of current work points to the conclusion that equipment available commercially in the next decade will probably take the form of hybrid structures comprising both individually fabricated parts, and single-process parts arrays, all mounted or processed onto an insulating substrate. (Author)

AD-268 083 Div. 8, 2
(TISTE/CRJ) OTS price $1.60

Centro Radioelettrico Sperimentale G. Marconi (Italy).
EXPERIMENTS ON BACKSCATTER OF H.F. RADIOWAVES FROM OPEN AND COASTAL SEA,
by I. Ranzi. 1 Mar 61, 8p. incl. illus. (Scientific note no. 3)
(Contract AF 61(052)139)
(AFCRL-736) Unclassified report

DESCRIPTORS: (Oceans, Ocean waves, Lakes.) (*Radio waves, High frequency, Scattering, Reflection, Polarization.) Italy.

By means of a phase device, it was possible to ascertain that the echoes, due to the backscatter of vertically polarized HF radiowaves from open sea, show a doppler frequency shift, which closely agrees with the one calculated on the ground of the velocity of the sea waves having a length lambda/2. An apparent voltage reflection coefficient of the sea waves is defined; its maximum observed values on 4 and on 28 mc are of the same order of magnitude; with a calm sea, this coefficient is more than ten-fold greater on 28 mc than on 4 mc. The sea echo intensity, on 28 mc, lowers by about 26 db, while changing from vertical to horizontal polarization. Finally, it became evident that strong backscatter was due to the sea waves near a coastal boundary. (Author)

AD-268 084 Div. 8
(TISTE/CRJ) OTS price $1.60

Centro Radioelettrico Sperimentale G. Marconi (Italy).
BACKSCATTER SOUNDING DURING IONOSPHERIC STORMS,
by I. Ranzi and P. Dominici. 15 May 61, 6p. illus. (Scientific note no. 5)
(Contract AF 61(052)139)
(AFCRL-912) Unclassified report

DESCRIPTORS: (*Ionospheric disturbances, *Wave transmission, *Radio transmission.) (Electromagnetic waves, Radio waves, Scattering, *Ionospheric propagation, Propagation, Electromagnetic wave reflections.) Italy.

The results of the ionospheric sounding by ground backscatter carried out at Torrechiaruccia (S. Marinella, Roma), during some severe iono-

spheric storms from August 1957 to February 1961, are briefly discussed. The advantages of the backscatter sounding to study the morphology of an ionospheric storm over a large area are put in evidence. The observed displacement of the perturbed zone may be explained as the result of the superposition of the storm components. During an ionospheric storm, the echoes from the non disturbed zone show a stronger intensity and a wider extent than in normal conditions. (Author)

AD-268 096 Div. 8, 26
(TISTM/REB) OTS price $1.60

General Dynamics/Electronics, San Diego, Calif.
APPLICATION OF NEW MATERIALS AND TECHNIQUES IN ELECTRON GUN FABRICATION.
Interim development rept. 1 July-30 Sep 61. 15 Nov 61, 10p. incl. illus.
(Contract NObsr-81208)
Unclassified report

DESCRIPTORS: (*Electron guns, Design, Production, Materials, Manufacturing methods.)

Split cylinder electron guns have been evaluated from the operational standpoint. They give satisfactory performance on both electronic and mechanical tests, although minor performance differences do exist. Broken mold parts have seriously delayed delivery of the gun design employing a cylindrical tube structure, but the difficulties have been corrected and delivery is expected in the near future. (Author)

AD-268 098 Div. 8, 1
(TISTE/NTM) OTS price $1.60

Advanced Electronics Center, General Electric Co., Ithaca, N. Y.
PART REJECTION ANALYSIS.
Rept. on Factors Affecting the Reliability of Electronic Equipment,
by R. E. Warr, F. Applegate, and T. Andrews. Sep 60, 18p. incl. illus. tables.
(Contract AF 33(616)7626, Proj. 4156)
(WADD TR 60-516) Unclassified report

DESCRIPTORS: (*Electrical equipment, *Electronic equipment, *Airborne, Reliability, *Quality control, Military equipment, Manufacturing methods, Tests.)

A portion of the reliability study and investigation of aeronautical electronic equipment is given. The data for the study were selected from 2 quality control operations, one a manufacturer producing a number of different airborne electronic equipments and the other a manufacturer producing a single missile guidance equipment. Data were analyzed in terms of vendor quality, part type quality, and the nature of the defects. (Author)

9. FLUID MECHANICS

AD-267 105 Div. 9
(TISTP/MFA) OTS price $6.60

Southampton U. (Gt. Brit.).
ATOMIC RECOMBINATION IN NOZZLES. METHODS OF ANALYSIS FOR FLOWS WITH COMPLICATED CHEMISTRY,
by K. N. C. Bray and J. P. Appleton. Apr 61, 57p. (Technical note no. 7; Rept. no. 166)
(Contract AF 61(052)250)
(ARL-143) Unclassified report

DESCRIPTORS: (*Recombination reactions in *Hypersonic nozzles, Boundary layer, Gas flow, *Jet mixing flow, Dissociation.) (Thermodynamics, Kinetic theory, Chemical properties, Experimental data.) (Numerical analysis, Differential equations, Integration.)

The feasibility of performing accurate calculations on the non-equilibrium flow of a complicated gas mixture through nozzles, with particular reference to the propulsive nozzle of the hypersonic ram-jet is studied. Equations are given for the steady, quasi-one-dimensional, adiabatic flow of a general reacting gas mixture, consisting of N species related through N chemical reactions. A number of alternative methods of obtaining numerical solutions are evaluated. The formulation of the system of chemical reactions is also discussed, together with the availability of the large amount of thermodynamic and chemical kinetic data which is required before a numerical solution can be attempted. It is found that the most serious difficulty to be overcome before accurate non-equilibrium nozzle calculations can be performed, is obtaining reliable data on the rates of the many chemical reactions which may be involved. (Author)

AD-267 106 Div. 9, 30
(TISTP/MFA) OTS price $3.60

Southampton U. (Gt. Brit.).
VELOCITY MEASUREMENTS IN THE UNIVERSITY OF SOUTHAMPTON HYPERSONIC GUN TUNNEL,
by G. E. Merritt. Apr 61, 23p. (Technical note no. 8; Rept. no. 172)
(Contract AF 61(052)250)
(ARL-144) Unclassified report

DESCRIPTORS: (Hypervelocity guns, *Hypersonic flow, Velocity, Measurement, Hypersonic wind tunnels, Boundary layer, Gas discharges.) (Instrumentation, Photomultiplier, Oscilloscopes, Chronographs.) (Schlieren photography, Photographic analysis.)

A method of measuring flow velocity by observing the propagation of a cylindrical shock wave produced by a long (1.6 in.) spark discharge is described. Results are given of measurements made in air at a Mach number of approximately eleven using the University of Southampton hypersonic gun tunnel. Stagnation temperatures, over a range of initial conditions, were calculated from the velocity results, an allowance being made for the caloric imperfection of the air. A maximum possible error of plus or minus 4% in the stagnation temperature (800 to 1,400 K) is claimed. During a run of 40 m sec, considerable cooling of the air in the stagnation region was observed (up to 30% loss in stagnation temperature) causing a variation in flow properties with time. The possibility of using this method to measure the density of the flow is discussed briefly. (Author)

AD-267 107 Div. 9
(TISTP/MFA) OTS price $1.60

Southampton U. (Gt. Brit.).
ATOMIC RECOMBINATION IN NOZZLES. METHODS OF

ANALYSIS FOR FLOWS WITH COMPLICATED CHEMISTRY II,
by K. N. C. Bray and J. P. Appleton. May 61, 11p. (Rept. no. 178)
(Contract AF 61(052)250)
(ARL-145) Unclassified report

DESCRIPTORS: (*Recombination reactions in *Nozzles, Gas flow, Analysis, Chemical reactions, *Chemical equilibrium.) (Molecular structure, Molecular weight.) (Equations, Differential equations.)

Criteria which may be used to test for departures from chemical equilibrium of a set of chemical reactions taking place in a nozzle flow are presented. The case in which the total number of reactions exceeds the number of molecular species present in the mixture is considered. The theory contained is an extension to, Atomic recombination in nozzles: Methods of analysis for flows with complicated chemistry, by the present authors. (Author)

AD-267 108 Div. 9
(TISTP/MFA) OTS price $1.60

Southampton U. (Gt. Brit.).
A SIMPLIFIED SUDDEN-FREEZING ANALYSIS FOR NON-EQUILIBRIUM NOZZLE FLOWS,
by K. N. C. Bray. Dec 60, 10p. illus. (Technical note no. 6; Rept. no. 161)
(Contract AF 61(052)250)
(ARL-161) Unclassified report

DESCRIPTORS: (*Gas flow, *Nozzles, Thermodynamics, Entropy, Enthalpy, Recombination reactions, Dissociation, Air.)

A simplified sudden-freezing analysis for non-equilibrium nozzle flows is used to show that the thermodynamic state of the gas after freezing is independent of the reservoir enthalpy. The flow through a given nozzle may then be represented on a single Mollier-type diagram for a wide range of reservoir conditions. Such diagrams are presented for an ideal dissociating gas and for a simple model of air. (Author)

AD-267 125 Div. 9
(TISTP/MFA) OTS price $8.60

Grumman Aircraft Engineering Corp., Bethpage, N. Y.
SHOCK LAYER STRUCTURE AND ENTROPY LAYERS IN HYPERSONIC CONICAL FLOWS,
by Robert E. Melnik and Richard A. Scheuing. Sep 61, 83p. incl. illus. 15 refs. (Research rept. no. RE-149)
(Contract AF 33(616)6400)
Unclassified report

Originally presented as Paper no. 1982-61 at the American Rocket Society and Air Force Office of Scientific Research International Hypersonics Conference, Massachusetts Institute of Technology, Cambridge, Massachusetts on August 18, 1961.

DESCRIPTORS: (*Hypersonic flow, Axially symmetric flow, *Shock waves, Boundary layer, Gases, *Conical bodies, *Triangular wings.) (Thermodynamics, Entropy, Enthalpy.) (Equations, Partial differential equations, Complex variables, Perturbation theory.)

The problem of obtaining uniformly valid solutions to the nonlinear conical flow equations in the thin-shock-layer limit is presented. The significance and nature of the associated streamline patterns and in particular, of the loci of entering streamlines are discussed at some length. The basic thin-shock-layer theory is shown to be nonuniformly valid on certain crossflow surfaces. The nonuniformities are of the general type referred to as entropy layer. (Author)

AD-267 133 Div. 9, 25
(TISTP/MFA) OTS price $8.10

University of Southern Calif. Engineering Center, Los Angeles.
EXPERIMENTAL STUDY OF THE HEATING OF GAS FLOW BY HIGH-FREENCY DISCHARGE,
by James C. Williams, III, Paul C. Wilbur and others. Sep 61, 81p. incl. illus. table.
(Contract AF 40(600)857, Proj. no. 8952)
(AEDC-TR-61-11) Unclassified report

DESCRIPTORS: (*Electric discharges, Radio-frequency, *High frequency, Gas flow, Heating, *Supersonics, Plasma physics, Axially symmetric flow.) (Supersonic nozzles, Interferometers, Calorimeters, Measurement.) (Experimental data, Pressure, Temperature.)

An experimental investigation was carried out to determine the feasibility of using a radio-frequency discharge to heat a supersonic gas stream. Experiments were conducted with both axisymmetric and two-dimensional supersonic nozzles with the RF discharge created in the supersonic gas flow. Temperature measurements in the flow field downstream of the discharge indicate a definite temperature rise in the decaying plasma. Calorimetry measurements show that it is possible to add up to 40% of the energy available at the discharge plates to the gas stream. It is concluded that radio-frequency discharge heating is a feasible method of heating a supersonic gas stream. (Author)

AD-267 142 Div. 9
(TISTP/JW) OTS price $1.25

Systems Dynamic Analysis Div., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
USE OF NUMERICAL ANALYSIS AND DIGITAL COMPUTATIONAL TECHNIQUES TO DETERMINE ONE-DIMENSIONAL HEAT FLOW THAT IS SUBJECT TO A MOVING BOUNDARY. Rept. for 11 Apr 60-1 Apr 61 on Automatic Computation and Control Techniques,
by Bernard Rodstein. July 61, 36p.
(Proj. 7062)
(ASD TN 61-3) Unclassified report

DESCRIPTORS: (*Boundary layer, Temperature, Distribution, Heat transfer, *Thermal conductivity.) (Insulating materials, *Heat transfer.) (Numerical methods and procedures, Numerical analysis, Digital computers.)

The time history of the temperature distribution over a slab which has one face insulated and the other face heated at a constant rate is examined. Until the heated face starts melting, the temperature distribution may be expressed by a series expansion. After melting has begun, the temperature distribution must be derived by numerical means. Both portions of the problem are presented, along with computer programs and numerical results of sample cases. (Author)

Division 9 - FLUID MECHANICS

AD-267 204 Div. 9
(TISTP/MFA) OTS price $1.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
THEORETICAL INVESTIGATION OF A TURBULENT PLANE PARALLEL STREAM AT HIGH TEMPERATURE WITH CALCULATION OF DISSOCIATION AND IONIZATION (Teoreticheskoye Issledovaniye Turbulentnoy Poloskoparellel'noy Strui Vysokoy Temperatury S Uchetom Dissotsiatsii I Ionizatsii),
by V. A. Golubev, tr. by L. G. Robbins. Nov 61, 14p. incl. illus. (Trans. no. T-209 of Inzhenerno-Fizicheskiy Zhurnal 6: 42-50, June)
Unclassified report

DESCRIPTORS: (*Gas flow, *Turbulence, *High temperature research, Dissociation, Gas ionization, Boundary layer.) (Thermodynamics, Enthalpy, Energy, Specific heat, Compressible flow.) (Equations of Motion, Energy, Continuum mechanics.)

Particular solutions of differential equations of motion are derived. The formulae derived on the basis of these solutions, in combination with the solution of an energy equation, permit one to compute the parmeters of the stream and its boundaries. (Author)

AD-267 262 Div. 9
(TISTP/GRW) OTS price $6.60

Airesearch Mfg. Co., Los Angeles, Calif.
THERMODYNAMIC PROPERTIES OF 20.4 K-EQUILIBRIUM HYDROGEN,
by A. Shaffer and J. Rousseau. Oct 61, 49p. incl. illus. tables, 12 refs.
(Contract AF 33(616)7895, Proj. 1(1-3048)
(ASD TR 61-360) Unclassified report

DESCRIPTORS: (*Hydrogen, *Thermodynamics, Pressure, Temperature.) (*Gases, *High temperature research, Entropy, Enthalpy, Temperature, Pressure, Density, Dissociation.)

The thermodynamic properties of 20.4K-equilibrium hydrogen is presented for pressures between 1 and 3000 psia and temperatures between 25 and 5000 R. Several graphical representations of the data are given. These consist of temperature-enthopy, enthalpy-entropy, pressure-enthalpy, temperature-enthalpy, and temperature-density diagrams. Data are given to show the effect of ortho-para composition of hydrogen properties over the range of temperatures considered. High-temperature gas properties shown include the effects of dissociation and non-ideal gas behavior.

AD-267 263 Div. 9
(TISTE/CRJ) OTS price $3.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
THE EFFECT OF SECOND THROAT GEOMETRY ON THE PERFORMANCE OF EJECTORS WITHOUT INDUCED FLOW,
by R. C. Bauer and R. C. German. Nov 61, 42p. incl. illus. tables (Rept. no. AEDC TN 61-133)
(Contract AF 40(600)800, Proj. 6950)
Unclassified report

DESCRIPTORS: (*Exhaust gas ejectors, Nozzles, Diffusers, Exhaust diffusers, Configuration, Design.) (Supersonic nozzles, Pressure, Measurement, Tests.)

An investigation of ejectors without induced flow was made to determine the effects of second throat geometry and position on the starting and operating pressure ratios. Twenty-seven ejector configurations were tested using three 18-deg half angle conical nozzles and one contoured nozzle in combination with six, second throat configurations. Unheated air was used for all tests. The starting and operating pressure ratios were improved by the presence of a second throat. Second throat contraction ratio and length of minimum area had the greatest influence on the starting and operating pressure ratios. The limiting second throat contraction ratio determined in this investigation agrees with published NASA results, although the ejector geometries were considerably different. Two methods are presented for estimating the operating pressure ratio of second throat ejector configurations. (Author)

AD-267 279 Div. 9, 15
(TISTP/GRW) OTS price $4.60

Thompson Ramo Wooldridge, Inc., Los Angeles, Calif.
A SUMMARY OF SEVERAL TECHNIQUES USED IN THE ANALYSIS OF HIGH ENTHALPY LEVEL, HIGH COOLING RATIO TURBULENT BOUNDARY LAYERS ON BLUNT BODIES OF REVOLUTION,
by Richard L. Phillips. 16 Sep 57, 38p. (Rept. no. GM-TM-194)
Unclassified report

DESCRIPTORS: (Blunt bodies, *Turbulent boundary layer, *Enthalpy, Mathematical prediction.) (Bodies of revolution, *Boundary layer, *Heat transfer, Mathematical analysis, Integral equations, Differential equations.)

A summary is presented of the most widely used theories for prediction of heating rates in a high enthalpy, turbulent boundary layer in the presence of a highly cooled wall on a blunt body of revolution along with some brief comments on the basic differences between each method. Five separate methods are presented and the mathematics of each theory is discussed. (Author)

AD-267 300 Div. 9, 25
(TISPA/SEB) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
EFFECTS OF SURFACE RECOMBINATION ON HEAT TRANSFER TO BODIES IN A HIGH ENTHALPY STREAM OF PARTIALLY DISSOCIATED NITROGEN,
by Ernest L. Winkler and Roy N. Griffin, Jr. Dec 61, 27p. incl. illus. table (NASA Technical note D-1146)
Unclassified report

Also available from NASA. Wash. 25, D. C. as NASA Technical note D-1146.

DESCRIPTORS: (*Hypersonic flow, Gases, *Nitrogen, Dissociation, Ions, Enthalpy, Thermodynamics, Recombination reactions on Surfaces, *Heat transfer to Cylindrical bodies of Copper, Silicon compounds, Monoxides, Measurement, Tests.

Heat-transfer rates to two surfaces having widely different catalytic effectiveness are compared at a Mach number of 6 in a low-density stream of

partially dissociated N. The heat-transfer rate to a polished Cu cylinder is twice as great as the heat-transfer rate to a SiO-coated cylinder when the stream total energy content is 9000 Btu/lb. Various methods for determining the stream energy content, the stream velocity, and the stream Mach number were developed and compared. Methods for estimating the stream energy content by means of purely aerodynamic concepts may neglect the sizable fraction of the stream energy contained in molecular dissociation. (Author)

AD-267 305 Div. 9
(TISTA/WAW) OTS price $1.75

National Aeronautics and Space Administration, Washington, D. C.
INVESTIGATION OF THE PERFORMANCE OF AN AXIAL-FLOW-PUMP STAGE DESIGNED BY THE BLADE-ELEMENT THEORY - BLADE-ELEMENT DATA,
by James E. Crouse, Richard F. Soltis, and John C. Montgomery. Dec 61, 66p. incl. illus. tables (NASA Technical note no. D-1109)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-1109.

DESCRIPTORS: (*Propeller pumps, Rotor blades, Model tests, *Hydrodynamics, Cavitation, Design, Tests.)

The blade-element data of an axial-flow pump (rotor and stator) designed by utilizing blade-element methods in conjunction with axial-flow-compressor blade-element theory and data are presented in both the noncavitating and cavitating conditions. The noncavitating blade-element performance is compared with the design rules. Good pump performance was attained; however, it is apparent that, with more accurately defined rotor and stator minimum-loss incidence and deviation angles for pumps, this performance can be improved. The cavitating data showed that the pump stage had little drop in performance at a suction specific speed of 13,000. (Author)

AD-267 342 Div. 9, 1
(TISTP/JDP) OTS price $7.60

Vertol Div., Boeing Airplane Co., Morton, Pa.
WIND TUNNEL TESTS AND FURTHER ANALYSIS OF THE FLOATING WING FUEL TANKS FOR HELICOPTER RANGE EXTENSION. VOLUME 3. WING FLUTTER ANALYSIS 45 DEGREE SKEWED HINGE
by R. Gabel, R. Ricks, and V. Capurso. Aug 61, 74p. incl. illus. tables, 20 refs. (Rept. no. R-228)
(Contract DA 44-177-tc-550, Proj. 9X38-09-006)
(TCREC TR 61-104) Unclassified report

DESCRIPTORS: (*Floating wings, Helicopters, Flutter, Wind tunnel models, Tests.) (*Flutter, Triangular wings, Fuel tanks, Helicopters, Mathematical analysis, Fluid mechanics.) (*Helicopters, Range.)

Anti-symmetric and symmetric flutter investigations are performed on the Range Extension floating wing for various fuel loading conditions and combinations of wing modes. The method makes use of Theodorsen's oscillating aerodynamic loads for the generalized excitation. Mechanical equations of the system are obtained with Lagrange's method using several combinations of three wing modes and two rigid fuselage modes as generalized coordinates. Solution of the flutter determinant is obtained by an IBM 650 computer program. Results of flutter calculations are presented as plots of airspeed against wing modes frequency ratio, from which the flutter speed is determined. Results of the analysis indicate that the flutter characteristics of the delta hinge wing arrangement are unacceptable. The investigation shows that for both the 0% and 100% fuel configurations the flutter speeds are below the cruise speed of 80 knots. It is indicated that the low flutter critical speeds are closely associated with the aircraft roll-wing rigid body flap instability which was determined to be an aircraft flight instability. The wing design is being revised to a straight hinge configuration in which the necessary aerodynamic wing spring is being furnished by a differential flap system. (Author)

AD-267 352 Div. 9, 30
(TISTP/MFA) OTS price $1.75

Boeing Co., Seattle, Wash.
ADMITTANCE TECHNIQUES IN HIGH SPEED FLUTTER MODEL TESTING. PART I. EXPERIMENTAL RESULTS.
Rept. for 1 Nov 59-Dec 60 on Dynamic Problems in Flight Vehicles,
by Gifford W. Asher and Roy K. Watanabe.
July 61, 53p. incl. illus. tables.
(Contract AF 33(616)6836, Proj. 1370)
(WADD TR 61-31, pt. 1) Unclassified report

DESCRIPTORS: (*Flutter simulators, Wind tunnel models, Aerodynamic configurations, *Wing-body configurations, Supersonic flow.) (Atmosphere, *Gust loads, Tests, Flight testing, Flight paths.) (Mechanical properties, Admittance, Harmonic oscillators, Elasticity.) (Data transmission systems, Experimental data, Tables.) (Equations of Motion.)

A new method of high speed flutter model testing is presented. The method obtains free flight flutter information from restrained models in the wind tunnel through the use of mechanical admittance measurements. Flutter test data for a representative high speed wing-body configuration are presented at a Mach number of 1.5. Brief descriptions of the application of admittance techniques in the determination of aerodynamic data, in the determination of control surface transfer functions, and in the determination of atmospheric gust loads through elastic model tests are presented together with recommendations for future research in this area. (Author)

AD-267 359 Div. 9, 15
(TISTP/MFA) OTS price $9.60

Boeing Scientific Research Labs., Seattle, Wash.
THE CALCULUS OF VARIATIONS IN APPLIED AERODYNAMICS AND FLIGHT MECHANICS,
by Angelo Miele. June 61, 105p. illus. 151 refs.
(Rept. no. D1-82-0113)
Unclassified report

Paper contributed to the book Optimization Techniques, Academic Press, Inc., New York, 1962.

DESCRIPTORS: (*Calculus of variations, *Aerodynamics, Aerodynamic configurations, Bodies of revolution, Conical wings, Pressure, Drag, Boundary layer.) (*Flight, *Mechanics, Flight paths, Orbital flight paths, Rocket trajectories.) Bibliography.

The use of the calculus of variations techniques in applied aerodynamics is reviewed with partic-

ular regard to the determination of the geometry of the slender body of revolution having minimum pressure drag in Newtonian flow as well as of the two-dimensional wing having minimum pressure drag in linearized supersonic flow. Also, the use of variational techniques in flight mechanics is reviewed with particular regard to the determination of the optimum paths for a rocket vehicle flying in either a vacuum or a resisting medium. Discontinuous solutions are discussed and the use of the switching function for predicting the composition of the extremal arc is demonstrated. (Author)

AD-267 395 Div. 9
(TISTP/WH) OTS price $2.60

Illinois U., Urbana.
BOUNDARY LAYER MOTION OF A GAS-SOLID SUSPENSION
by S. L. Soo. Oct 61, 42p. incl. illus. (Proj. Squid Technical rept. no. ILL-3-P)
(In cooperation with James Forrestal Research Center, Princeton, 4, N. J. Contract Nonr-185825, Proj. NR-098-038)
Unclassified report

DESCRIPTORS: (Solids, Particles, Gases, *Gas flow, Fluid mechanics.) (*Colloids, *Aerosols, Transport properties, Kinetic theory, *Boundary layers.) (Motion, Equations, Integral equations.)

A rigorous basic formulation of the dynamics of a two-phase gas-solid system is explored followed by a discussion of the apparent transport properties. These are followed by a discussion of boundary layer considerations in an effort toward obtaining solution for problems involving a gas-solid suspension. Momentum integral method is extended to the gas-solid system; possibility of solution will be explored with flow over a flat plate as the example. (Author)

AD-267 396 Div. 9
(TISTP/WH) OTS price $2.60

Illinois U., Urbana.
FULLY DEVELOPED TURBULENT PIPE FLOW OF A GAS SOLID SUSPENSION,
by S. L. Soo. Oct 61, 24p. incl. illus. 16 refs. (Proj. Squid Technical rept. no. ILL-2-P)
(In cooperation with James Forrestal Research Center, Princeton U., N. J., Contract Nonr-185825, Proj. NR-098-038)
Unclassified report

DESCRIPTORS: (Solids, Particles, Gases, *Gas flow, *Turbulent flow, Pipes.) (Fluid mechanics, Velocity, *Colloids, *Aerosols.)

Velocity and concentration distributions of solid phase were calculated for the case of low solid to gas mass ratios, small solid particles, and negligible gravity effect. Within the range where these specifications are valid, the solid particles slip at the wall and lag behind the stream at the center of the pipe. Velocity dependence on concentration distribution is also seen. (Author)

AD-267 397 Div. 9
(TISTP/WH) OTS price $2.60

Illinois U., Urbana.
ON THE SOLUTION OF FLOW OF A GAS-SOLID SUSPENSION THROUGH A NOZZLE OF ARBITRARY AREA DISTRIBUTION,
by S. L. Soo. Oct 61, 21p. incl. illus. (Proj. Squid Technical rept. no. ILL-4-P)
(In cooperation with James Forrestal Research Center, Princeton, U., N. J., Contract Nonr-185825, Proj. NR-098-038)
Unclassified report

DESCRIPTORS: (Solids, Particles, Gases, *Gas flow, Transonic flow, *Laval nozzles.) (Mathematical analysis, Fluid mechanics, Differential equations, *Colloids, *Aerosols.

A rigorous determination of the sonic velocity of a gas-solid mixture at the throat of a de Laval nozzle is presented. The steps of the solution are discussed. (Author)

AD-267 414 Div. 9
(TISTP/WH) OTS price $2.60

Hydronautics, Inc., Rockville, Md.
SECOND-ORDER SUPERCAVITATING HYDROFOIL THEORY,
by C. F. Chen. Oct 61, 16p. illus. (Technical rept. no. 121-1)
(Contract Nonr-343500, Proj. NR 062-265)
Unclassified report

DESCRIPTORS: (*Hydrodynamics, *Hydrofoils, Cavitation, Theory.) (Hydrodynamics, Lift, Drag.) (Series, Integral equations, Transformations (Mathematics).)

The second-order problem of Helmholtz flow past lifting hydrofoils and symmetric struts was formulated and solved. The solution involves elementary operations on the known solutions of the first-order problem. The second-order lift and drag coefficients are given in integral form. Results obtained for a flat plate at incidence and a symmetric wedge agree with the exact solutions up to the second order. (Author)

AD-267 486 Div. 9, 30
(TISTP/TL) OTS price $7.60

Guggenheim Aeronautical Lab., Calif. Inst. of Tech., Pasadena.
HOT-WIRE MEASUREMENTS IN LOW REYNOLDS NUMBER HYPERSONIC FLOWS.
Rept. on Hypersonic Research Project,
by C. Forbes Dewey, Jr. 15 Sep 61, 70p. incl. illus. (Memo. no. 63)
(Contracts DA 04-495-ORD-1960 and DA 04-495-ORD-3231)
Unclassified report

DESCRIPTORS: (*Hypersonic flow, *Supersonic flow, *Wire, *Anemometers, Measurement, *Reynolds number, Mach number, Gases, *Superaerodynamics.) (Molecules, Compressible flow, Boundary layer, Transition temperature, Heat exchangers, Heat transfer, Temperature, Thermodynamics, Thermocouples, Pitot tubes.) (Wake, *Cylindrical bodies, *Bodies of revolution, *Blunt bodies, Pressure, Instrumentation.) (Electric bridges, Wiring diagrams, Circuits.) (Wind tunnels, Ovens.) Integration.

Measurements were made of the heat loss and recovery temperature of a fine hot-wire at a nominal Mach number of 5.8. Data were obtained over an eight-fold range of Reynolds numbers in the transitional regime between continuum and free-molecule flow. At high Reynolds numbers, the heat transfer data agree well with the results of Laufer and McClellan (J. Fluid Mech., Vol. 1, 3:276-289, 1956) which were obtained at lower Mach numbers. At lower Reynolds numbers, the results indicate a monotomic transition between continuum and free molecule heat transfer laws. (Author)

AD-267 490 Div. 9
(TISTA/WAW) OTS price $7.60

Douglas Aircraft Co., El Segundo, Calif.
A SOLUTION TO THE BLAST WAVE DIFFRACTION PROBLEM.
Technical rept.,
by Edward R. Fleming. Sep 61, 71p. incl. illus. tables, 10 refs. (Rept. no. ES 40245 A)
(Contract NOa(s) 53-381-c)
Unclassified report

DESCRIPTORS: (Airfoils, Wings, *Aerodynamics, Transonics, Pressure, Lift, *Gust loads, *Blast, *Shock waves from Explosions, Nuclear explosions, Diffraction, Interference, Mathematical analysis, Differential equations, Partial differential equations, Integral equations.)

An analysis is given of the diffraction of a blast wave during encounter with a subsonically traveling, two-dimensional airfoil of finite chord. The method of analysis employed is the conical flow technique of geometrical acoustics. Results are given in closed analytical form as well as numerically. Representative numerical results are compared with the results of the two-dimensional traveling gust theory. (Author)

AD-267 510 Div. 9, 14
(TISTA/SEB) OTS price $3.00

Laboratories for Applied Sciences, U. of Chicago, Ill.
THERMAL PROTECTION OF STRUCTURAL, PROPULSION, AND TEMPERATURE-SENSATIVE MATERIALS FOR HYPERSONIC AND SPACE FLIGHT. PART III. ANALYTICAL STUDIES OF PHENOMENA FOR THERMAL PROTECTION.
Rept. for 1 Oct 59-30 Nov 60, on The Chemistry and Physics of Materials,
by William P. Manos and Donald E. Taylor.
July 61, 167p. incl. illus. tables.
(Contract AF 33(616)6006, Proj. 7360)
(WADD TR 59-366, pt. 3) Unclassified report

DESCRIPTORS: (*Materials, Thermal stresses, Temperature, *Hypersonic flow.) (Fluid flow, Gases, Air, Helium, Injection through Porous materials, Cooling, Hypersonics, Transport properties, Boundary layer, Axially symmetric flow, Turbulent boundary layer, Turbulent flow, Theory, Mathematical analysis.) (Cooling of Aerodynamic heating, Heat transfer, Thermodynamics.)

Mass transfer cooling in turbulent boundary layers was studied analytically. For 0 pressure gradient, flat plate flow, the effectiveness of mass addition in reducing heat transfer was less in the turbulent boundary layers than in laminar boundary layers. The cooling phenomenon at axisymmetric stagnation points was studied by introducing air and He through a porous wall. Below certain critical injection rates, experimental heat transfer with air injection agreed with theoretical predictions. For coolant flow rates in excess of certain critical values, heat transfer rates increased and became erratic. The effect of upstream mass injection on downstream heat transfer shows downstream heat transfer increased from mass injection. The 1-megawatt air-stablized arc was operated with a mixing chamber and transition piece, and characterization studies including temperature determinations and calorimetry were performed. (Author)

AD-267 517 Div. 9
(TISTP/MFA) OTS price $1.60

James Forrestal Research Center, Princeton U., N. J.
ON A BOUNDARY VALUE PROBLEM IN THE KINETIC THEORY OF BROWNIAN MOTION,
by Ira M. Cohen. July 61, 14p. (Rept. no. 568)
(Contract AF 49(638)465, Proj. 9781)
(AFOSR-1454) Unclassified report

DESCRIPTORS: (*Kinetic theory of *Gases, Chemical properties, Motion, Particles, Molecules, Diffusion.) (Plasma physics, *Boundary layer, *Absorption, Cylindrical bodies.) (Partial differential equations, Integral transforms, Integration, Distribution theory, Velocity.)

The proposed boundary value problem in the kinetic theory of Brownian movement was solved. It is, in principle, possible to calculate the velocity distribution of the Brownian particles as a function of distance from one of the two walls. In particular, if one wall is an absorbing barrier, 0, one may calculate how the distribution in velocities is skewed as the absorbing wall is approached. This particular solution may have some relevance to the theory of plasma probes. (Author)

AD-267 570 Div. 9, 10
(TISTP/TL) OTS price $8.10

Aeronutronic, Newport Beach, Calif.
COMBUSTION IN THE TURBULENT BOUNDARY LAYER OF CHEMICALLY ACTIVE SUBLIMATORS,
by M. R. Denison. 10 Mar 58, 71p. incl. illus.
(Publication no. U-166)
(Contract AF 04(647)155)
Unclassified report

DESCRIPTORS: (*Turbulent boundary layer, *Combustion, Reaction kinetics, *Blunt bodies, Sublimation, *Turbulent flow, Analysis, *Chemical reactions, Chemical analysis, Gases, Diffusion, Oxidation.) (Surfaces, Materials, *Graphite, Theory, Heat transfer.) (Velocity, Friction, Enthalpy, Density.)

An aerothermochemical analysis of chemically active surfaces immersed in a high speed stream of an oxidizing gas mixture is presented. The analysis applies to turbulent flow over blunt bodies whose surface material passes into the gaseous phase without going through the liquid state. The theory is developed in general for a whole class of sublimators and is applied to the particular case of graphite combustion about which a great deal of fundamental data is available. (Author)

Division 9 - FLUID MECHANICS

AD-267 639 Div. 9, 25
(TISTP/TL) OTS price $2.60

Institute of Mathematical Sciences, New York U., N. Y.
GEOMETRICAL ACOUSTICS I: THE THEORY OF WEAK SHOCK WAVES,
by Joseph B. Keller. Jan 53, 27p. incl. illus.
(Rept. no. IMM-NYU 188)
(Contract Nonr-28502)
(AFSWP-194) Unclassified report

DESCRIPTORS: (*Shock waves, Theory, Propagation, Reflection, *Acoustics, Sound transmission, *Shock tubes, *Continuum mechanics, Optics.) (High frequency, Fluid mechanics, Gases, *Supersonic flow, *Subsonic flow, Pressure.) (Integral equations, Differential equations.) (Fluid flow, Particles, Velocity, Temperature, Heat, Entropy.)

Contents:
Discontinuity conditions in continuum mechanics
Fundamental equations
Shocks, contact discontinuities and phase change fronts
Perfect fluids
Geometrical acoustics - weak shocks
The variational or acoustic equations
Acoustic Discontinuities
Wavefronts and rays
Variation of shock strength along a ray
Reflection and transmission of an acoustic shock at a contact discontinuity Expansion ratio for straight rays
The Shock Tube

AD-267 674 Div. 9
(TISTA/WAW) OTS price $4.60

Princeton U., N. J.
THE EFFECT OF LEADING EDGE CONDITIONS ON THE DETAILED FLOW OVER A FLAT PLATE AT M = 11.7,
by W. J. Graham and I. E. Vas. Sep 61, 17p. illus. tables, 12 refs. (Rept. no. 565)
(Contract AF 33(616)7629, Proj. 7064)
(ARL-138) Unclassified report

DESCRIPTORS: (*Sheets, *Airfoils, Aerodynamics, *Hypersonics, Gas flow, Surfaces, Model tests, Wind tunnel models, *Boundary layer, Laminar boundary layer, Shock waves, Interference.) (Shock waves, Pressure, Measurement.)

A study was carried out in the Princeton University Helium Hypersonic Wind Tunnel to examine the flow over a flat plate at a Mach number of 11.7. The leading edge Reynolds number was varied from 192 to 20,900. Primarily viscous effects were noted for Re (a Reynolds number based on leading edge thickness and free stream conditions) of less than 200 and primarily inviscid effects for Re greater than 5000. For the lowest Re, the shock shape varied as x to the 0.9th power (where x is the hypersonic viscous interaction parameter) and the pressure along the surface varies as x to the -0.55th power. Both of these results are in fair agreement with the available theories. At high Reynolds numbers, the slope of the shock shape was predicted by the blast wave theory but the absolute value was about 20% more than the predicted value. At the highest leading edge Reynolds number, the magnitude of the pressure distribution was well predicted by the blast wave theory. The attempt to predict the pressures by use of a linear combination of the inviscid and viscous terms was not satisfactory. Deviations as high as 30% were found for intermediate and high Reynolds numbers. Examination of the conditions behind the shock wave and several methods of predicting the Mach number at the edge of the boundary layer indicate the strong variation of the general flow field which is a function of the leading edge thickness. (Author)

AD-267 675 Div. 9, 14, 25
(TISTM/TCG) OTS price $2.25

Polytechnic Inst. of Brooklyn, N. Y.
RESULTS OF ABLATION TESTS ON SEVERAL PLASTIC MODELS IN A HYPERSONIC WIND TUNNEL.
Final rept. for 1 July 58-28 Feb 61 on Experimental Techniques for Materials Research,
by Constantino Economos. July 61, 82p. incl. illus. tables, 56 refs.
(Contract AF 33(616)5944, Proj. 7364)
(WADD TN 60-273) Unclassified report

DESCRIPTORS: (*Ablation, Hemispherical shells, *Plastics, Model tests in Hypersonic wind tunnels, Aerodynamic heating, Heat transfer, Axially symmetric flow, Boundary layer, Theory.) (Materials, Polymers, Ethylenes, Fluorides, Methyl radicals, Acrylic resins, Nylon, Physical properties, Vaporization, Sublimation, Melting, Deformation, Deterioration.) (Laboratory equipment, Instrumentation, Convection, Heating.)

An experimental study of transient ablation was carried out in a wind tunnel which utilizes the PIBAL pebble bed convection heater as a source of high energy air. Hemispherical models made of several plastic materials were ablated in this facility and the final configuration compared with the predictions of a transient theory, which uses an integral technique. Good agreement was found only for those plastics which may be classified as of a subliming type. For the remaining materials which melt and flow without significant vaporization the transient theory predicts values of the surface recession which are much lower than those obtained experimentally. The models were exposed to both a laminar and transitional heat transfer environment. The appropriate heat transfer theories required for the calculation are reviewed and discussed in detail. Corresponding heating rates were measured experimentally and are compared with these analyses. Theory and experiment are shown to be in good agreement. A description of the facility and its development is presented. (Author)

AD-267 727 Div. 9, 1
(TISTA/VGW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE EFFECT OF ROUGHNESS ON THE AERODYNAMIC RESISTANCE OF PIPE BUNDLES SUBJECTED TO A TRANSVERSE GAS FLOW,
by F. P. Kazakevich. 15 Nov 61, 8p. incl. illus. table (Trans. no. FTD-TT-61-87 of Teploenergetika 1:56-58, 1961)
Unclassified report

DESCRIPTORS: (Mathematical analysis of Aerodynamics, Drag, Pressure, Turbulence, Turbulent boundary layer, *Boundary layer, Gas flow, Fluid flow over *Pipes, Cylindrical bodies, Heat exchangers, Heat transfer, Surfaces, Surface properties, Mathematical prediction.) (Technological intelligence, Translations, USSR.)

The results of an experimental investigation of

the aerodynamic resistance of checkerboard pipe bundles with external surfaces of different relative roughnesses are considered for the case where the bundles are subjected to a transverse flow. (Author)

AD-267 730 Div. 9, 4
(TISTM/TCG) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE SYMMETRIC ELECTRIZATION OF DROPS WITH MECHANICAL ATOMIZATION OF LIQUIDS,
by G. L. Natanson. 15 Nov 61, 23p. incl. illus. tables, 18 refs. (Trans. no. MCL-1324 of Zhurnal Fizicheskoy Khimii 25:779-790, 1951)
Unclassified report

DESCRIPTORS: (Production, Electric discharges, Electric currents in *Drops by Atomization, *Liquids, Electrolytes, Hydrogen ion concentration, Voltage.) (Butyl radicals, Ammonium picrate, Ammonium radicals, Pentyl radicals, Iodides in Cresyl radicals, Phosphates or Phthalates or Castor oil, Potassium compounds, Chlorides in Glycerols.) *USSR, Translations, Technological intelligence.

An investigation was made on the electrization of drops during the mechanical atomization of liquids as a function of the ion concentration in the liquid (in the range 10 to the - 7th power to 1 mole/liter) and the drop radius (from 0.5 to 2 micron). The results obtained are discussed from the standpoint of the fluctuation mechanism of the origin of drop charges. (Author)

AD-267 752 Div. 9, 12
(TISTP/WH) OTS price $1.10

Ramo-Wooldridge Corp., Los Angeles, Calif.
ON THE DAMPING OF LIQUID SLOSHING BY RINGS,
by John W. Miles. 6 May 57, 8p. (Rept. no. GM 61.4-9)
Unclassified report

DESCRIPTORS: (*Damping of *Liquids, Fluid flow, Turbulence, Oscillation, Vibration, Motion by *Rings and *Drag, Mathematical analysis, Experimental data.) Liquid rocket propellants.

A rough analysis of the effect of an annular ring on the sloshing oscillations of liquid in a cylindrical tank is carried out. The damping per cycle (logarithmic decrement) for moderate amplitudes is predicted as proportional to the square root of the amplitude and the three-halves power of the ring area. The corresponding force on the ring also is calculated. (Author)

AD-267 753 Div. 9
(TISTP/WH) OTS price $1.10

Ramo-Wooldridge Corp., Los Angeles, Calif.
DYNAMICS OF A RIGID BODIED MISSILE WITH PROPELLANT SLOSHING IN FOUR TANKS,
by H. C. Thomson. 16 Oct 57, 9p. incl. illus. (Rept. no. GM 45.3-433)
Unclassified report

DESCRIPTORS: (*Aerodynamics, Guided missiles, *Fluids, Turbulence, Motion, Vibration, Mathematical analysis.) (Liquids, Hydrodynamics, *Propellants, Tanks.) (Equations, Motion.) (Fluid flow, Oscillation.)

This memo summarizes results obtained in an analysis of the dynamics of a rigid missile flying with fluid sloshing in four separate tanks. The equations of motion are presented in a form suitable for use in programming an analog computer; and they are solved to yield the airframe transfer function for use in stability studies. (Author)

AD-267 755 Div. 9, 12, 1
(TISTA/VGW) OTS price $2.60

Space Technology Labs., Inc., Los Angeles, Calif.
A CRITICAL EXAMINATION OF THE BOUNDARY LAYER EQUATIONS INCLUDING CHEMICAL REACTIONS DUE TO MASS ADDITION,
by R. Bromberg and R. P. Lipkis. 15 Jan 58, 24p. (Rept. no. GM-TR-0165-00288)
(Contract AF 18(600)1190)
Unclassified report

DESCRIPTORS: (Differential equations for Boundary layer, *Heat transfer, Transport properties, Chemical reactions on Surfaces of Supersonic airplanes, Guided missiles in Gas flow, Supersonic flow.) (Aerodynamic heating, Thermodynamics of *Boundary layer by Ejection, Injection of Gases, Diffusion, Enthalpy, Dissociation, Recombination reactions, Gas ionization, Carbon, Combustion, Mathematical analysis.)

A review is presented of essential features of differential equations applicable in the boundary layer with mass transfer at the wall, including consideration of chemical reactions. A brief derivation is given and the equations are presented in the alternate forms useful for various applications. Special discussion is given of the wall boundary conditions because of possible confusion arising from effects of mass transfer at the wall. A general solution to these equations is obtained which makes it possible to determine the heat transfer potentials, subject only to the requirement that Lewis Moduli equal unity, for all possible boundary layer chemical reactions; no limitation is placed on reaction rates or other details of the reaction, or on the Prandtl Modulus. In the limiting case where reactions go to completion the potential may be written directly. As examples, solutions are presented for the case of combustion of carbon to CO and for the dissociation and recombination within the boundary layer of an injected material. (Author)

AD-267 761 Div. 9
(TISTM/TCG) OTS price $1.60

Southampton U. (Gt. Brit.).
ON MOLECULAR VIBRATIONAL RELAXATION IN THE FLOW OF A CHEMICALLY REACTING GAS,

by P. J. Musgrove and J. P. Appleton. June 61, 13p. illus. 13 refs. (Technical note no. 10; Rept. no. 183)
(Contract AF 61(052)250)
(ARL-188) Unclassified report

DESCRIPTORS: (Reaction kinetics, *Gases in Hypersonic nozzle, Vibration, Temperature, *Gas flow, Relaxation time, Hypersonic flow by Perturbation theory, Test methods, Energy, Velocity, Mathematical analysis, Shock waves.) Molecules, Theory, Mathematical prediction.

A method is presented for predicting the molecular vibrational temperature in a gas flow where the internal energy of vibration is small compared to the total internal energy of the gas. Coupling between the relaxation rate of molecular vibration and atomic recombination is neglected. The results of calculations suggest that large differences between the vibrational temperature and the random translational temperature of an oxygen-like gas can occur in certain flow configurations such as the flow of a chemically reacting gas through a hypersonic nozzle. A criterion is proposed which determines the position in the flow at which significant departures from vibrational equilibrium are likely to occur. (Author)

AD-267 768 Div. 9, 10, 27
(TISTA/SEB) OTS price $5.60

United Technology Corp., Sunnyvale, Calif.
DYNAMICS OF TWO-PHASE FLOW IN ROCKET NOZZLES.
Quarterly technical progress rept. no. 2, 1 Aug-31 Oct 61,
by B. G. Wrenn, R. Dunlap and J. J. Allport. 30 Nov 61, 59p. incl. illus. (Rept. no. 2005 QT2)
(Contract NOw 61-0760-c)
Unclassified report

DESCRIPTORS: (*Rocket motor nozzles, Combustion chamber gases, Particles, *Exhaust gases, Fluid flow, Gas flow, Theory, Aerodynamics, Mathematical analysis, Computers, Programming.) (Rocket motor nozzles, Design, Manufacturing methods, Electroforming.) (Test equipment, Pressure vessels.) (*Solid rocket propellants, Fuel additives, Metals, Ammonium radicals, Molybdenum compounds, Phosphates, Measurement, Density.)

A critical review of the one-dimensional theory of two-phase flow was completed. A computer program to compute the properties of two-phase flow, using this theory, was devised and placed in operation. The results of the computer program and the review show that the constant-lag approximation to the one-dimensional theory is useful for engineering calculations of two-phase flow in nozzles of conventional design, not only for the Stokes flow region but also for the non-Stokes flow region. Fabrication of the pressure vessels and associated mechanical devices for the two-phase flow differential nozzle apparatus was completed. The problem of manufacturing nozzles of known contour and of precisely the same throat area was solved by electroforming techniques and 11 nozzles were manufactured. The two-phase flow differential-nozzle apparatus is assembled and is undergoing calibration experiments using pure gases. (Author)

AD-267 785 Div. 9, 25
(TISTP/WH) OTS price $2.60

California Inst. of Tech., Pasadena.
THEORY OF THE ACOUSTIC ABSORPTION BY A GAS BUBBLE IN A LIQUID,
by Din-Yu Hsieh and Milton S. Plesset. Nov 61, 19p. illus. (Rept. no. 85-19)
(Contract Nonr-22028)
Unclassified report

DESCRIPTORS: (Theory of *Acoustics, Sound, *Absorption by Gases, *Bubbles in *Liquids.) (Fluids, Mathematical analysis, Heat, Thermal radiation, Thermal conductivity.)

A complete analysis of acoustic absorption by a spherical gas bubble was developed by the application of the classical Rayleigh method. The absorption considered is that due to the viscosity and heat conduction of the gas bubble. Specific results are presented for the S-wave scatter and absorption for the case of an air bubble in water, and the absorption effects of viscosity and heat conduction alone are calculated explicitly. The results found here are of similar magnitude to those found by Pfriem and Spitzer who used an approximate procedure. (Author)

AD-267 825 Div. 9
(TISTA/SEB) OTS price $5.60

Polytechnic Inst. of Brooklyn, N. Y.
A FLAME ZONE MODEL FOR CHEMICAL REACTION IN A LAMINAR BOUNDARY LAYER WITH APPLICATION TO THE INJECTION OF HYDROGEN-OXYGEN MIXTURES.
Rept. on Research on Aerodynamic Flow Fields,
by Paul A. Libby and Constantino Economos. Oct 61, 52p. incl. illus. tables, 15 refs.
(Contract AF 33(616)7661, Proj. no. 7064)
(ARL 199) Unclassified report

DESCRIPTORS: (Gases, Mixtures, Hydrogen, Oxygen, Ejection, Injection, Combustion, Flames, Chemical reactions, Laminar boundary layer, Theory, Mathematical analysis.) (Wind tunnel models, *Hypersonic flow, Fluid flow, Gas flow, Injection through Porous materials, Aerodynamics, Ignition, Temperature.) (Gases, Reaction kinetics, Boundary layer, Aerodynamic heating, Heat transfer, Cooling, Porous materials.)

An analysis for the prediction of the boundary layer characteristics is derived for the case of a chemically reacting gas injected through a porous surface. It is assumed that the flow is steady and laminar with zero pressure gradient. The analysis is based on a model for combustion which utilizes the concept of an ignition temperature to distinguish between regions of frozen and equilibrium flow; the model is referred to as the flame zone model. Results of several numerical examples are presented to demonstrate the use of this model. These include the heat transfer rates to the porous surface as well as temperature and concentration distributions through the boundary layer. Calculations are carried out for conditions corresponding to hypersonic flight and to typical hypersonic wind tunnel flows and to injected gases consisting of either hydrogen or hydrogen-oxygen mixtures. (Author)

AD-267 859 Div. 9
(TISTP/MFA) OTS price $5.60

Stanford U., Calif.
SECOND-ORDER COMPRESSIBLE BOUNDARY-LAYER THEORY WITH APPLICATION TO BLUNT BODIES IN HYPERSONIC FLOW.

by Milton Van Dyke. July 61, 50p. (Rept. no. SUDAER 112)
(Contract AF 49(638)965)
(AFOSR-1270) Unclassified report

DESCRIPTORS: (*Boundary layer, *Compressible flow, Aerodynamic configurations, *Blunt bodies, *Hypersonic flow, Viscosity, Shock waves.) (Thermodynamics, Heat transfer, Entropy, Enthalpy.) (Perturbation theory, Equations of Motion, Partial differential equations, Operators (Mathematics), Integration.)

Viscous hypersonic flow near the nose of a blunt body is considered on the basis of the Navier-Stokes equations. Conventional boundary-layer theory is embedded in a systematic expansion scheme. The general theory of the second approximation is developed. Seven second-order effects are identified: longitudinal curvature, transverse curvature, slip, temperature jump, entropy gradient, stagnation enthalpy gradient, and displacement. Their evaluation for a blunt body is outlined, and numerical results given for the stagnation region of a cooled sphere at infinite Mach number. In that example the increase in heat transfer due to entropy gradient is reduced one third by the other second-order effects. (Author)

AD-267 879 Div. 9, 22
(TISTA/WAW) OTS price $1.60

Anti-Submarine Warfare Lab., Naval Air Development Center, Johnsville, Pa.
TOWED BIRD DYNAMICS.
Technical note,
by G. T. Moore. 30 Oct 61, 11p. incl. illus.
(Rept. no. NADC-AW-N6111)
Unclassified report

This Technical note is a transcript of the paper presented by Mr. Moore at the MAD Symposium held at the U. S. Naval Ordnance Laboratory, White Oak, Silver Spring, Maryland on 4 February 1960.

DESCRIPTORS: (*Towed bodies, *Aerodynamics, *Dynamics, Stability, Oscillation, Mathematical analysis, Differential equations.) (Airborne, *Magnetic detectors, Antisubmarine warfare.)

AD-267 888 Div. 9, 25
(TISTP/JW) OTS price $1.60

Rensselaer Polytechnic Inst., Troy, N.Y.
VORTEX FLOW IN A DISSOCIATING GAS,
by K. C. Wang. Sep 61, 8p. illus.
(Rept. no. TR AE 6108)
(Contract AF 49(638)977)
(AFOSR-1512)
Unclassified report

DESCRIPTORS: (Vortices, Compressible flow.) (*Gases, *Dissociation, Oxygen, Nitrogen.) *Fluid mechanics.

Analysis concerns a simple vortex flow in a compressible, inviscid, dissociating gas. Numerical results for frozen flow and equilibrium flow have been obtained, using Lighthill's ideal dissociating gas model. The differences in pressure and density between these two limiting cases are large, however it is relatively small in temperature. For the non-equilibrium flow case, there does not exist a simple vortex flow of the conventional type. (Author)

AD-267 907 Div. 9
(TISTP/MFA) OTS price $1.60

Aerospace Corp., Los Angeles, Calif.
SHOCK CURVATURE DUE TO BOUNDARY LAYER EFFECTS IN A SHOCK TUBE,
by R. A. Hartunian. 20 Dec 60, 16p. incl. illus.
(Rept. no. TDR-594(1217-01)TN-1)
(Contract AF 04(647)594)
Unclassified report

DESCRIPTORS: (*Boundary layer, *Shock waves, Shock tubes, Gas flow, Argon, Kinetic theory, High temperature research, Heat transfer, Pressure.) (Perturbation theory, Experimental data, Integral transforms, Differential equations.)

The analysis and results of a two-dimensional, linearized treatment, including real gas effects, are presented. An expression for shock shape as a function of shock Mach number and initial pressure of the test gas is presented. Results are compared with available experimental data obtained in argon at low shock strengths and in air at high shock Mach numbers. Within the scatter of the data in the latter experiments, there is relatively good agreement with theory, while theory falls approximately 30 + or - 10% above the data in argon. Some disagreement is attributed to application of the two-dimensional theoretical result to axisymmetric shock tubes of finite dimensions used in the experiments. (Author)

AD-267 914 Div. 9, 25
(TISTP/MFA) OTS price $2.60

Aeronautical Research Inst. of Sweden.
SECOND-ORDER THEORY FOR A THIN WING IN SUPERSONIC FLOW WITH A WEAK SPANWISE ENTROPY GRADIENT,
by Peter G. Wilby. June 61, 20p. incl. illus.
(FFA rept. no. 88; Technical rept. no. 5)
(Contract AF 61(052)75)
Unclassified report

DESCRIPTORS: (*Supersonic flow, Aerodynamic configurations, Blunt bodies, *Wings, *Shock waves, Vortices, Gas flow.) (Thermodynamics, Entropy, Enthalpy.) (Equations, Perturbation theory, Potential theory, Partial differential equations.)

The three-dimensional perturbation velocities over an infinite thin wing with a sharp leading edge in non-uniform supersonic flow are derived and used to investigate the second-order contribution to the pressure coefficient on a wing surface, due to a spanwise entropy gradient. Pressure distributions are calculated for a wedge section wing at various Mach numbers for probable values of entropy gradient. Results show that entropy gradient effects can be important. Procedure for application of the theory is given for the case of a wing situated behind the curved shock generated by a blunt nosed body. (Author)

AD-267 919 Div. 9
(TISTP/MFA) OTS price $4.60

Arnold Engineering Development Center, Arnold Air Force Station, Tenn.
CALCULATION OF THICKNESSES OF LAMINAR BOUNDARY LAYERS IN AXISYMMETRIC NOZZLES WITH LOW-DENSITY,

HYPERVELOCITY FLOWS,
by J. A. Durand and J. Leith Potter. Dec 61. 46p. incl. illus. (Rept. no. AEDC TN61-146)
(Contract AF 40(600)800)
Unclassified report

DESCRIPTORS: (*Laminar boundary layers, *Axially symmetric flow, *Hypersonic nozzles, Design, Hypersonic flow, Pipes.) (Thermodynamics, Heat transfer, Specific heat, Enthalpy.) (Experimental data, Analysis.)

A new method for the estimation of boundary-layer thickness corrections to the contours of cooled axisymmetric nozzles for low-density, hypersonic flows is presented. Laminar flows of real gases in thermodynamic equilibrium with possible variation of specific heats, frozen flows, and boundary-layer thicknesses of the order of nozzle radii are considered. The derivation combines an appropriate integral momentum relation with an approximate friction law based on local similarity. Results of application of the method to several typical cases are shown to agree closely with experimental data. (Author)

AD-267 954 Div. 9, 1
(TISTA/WAW) OTS price $1.60

Shin Meiwa Industry Co., Ltd.
TOWING TANK TESTS OF THE UF-2 SEAPLANE: THE ORIGINAL HULL AND IT'S MODIFICATIONS, HEAVE, TRIM, RESISTANCE AND LONGITUDINAL STABILITY. VOLUME 2.
31 July 61, 13p. incl. illus.
(Contract NOw 60-0460)
Unclassified report

DESCRIPTORS: (*Seaplanes, *Flying boats, *Flying boat hulls, *Hydrodynamics, Model tests, Design.) (Drag, Stability, Seaplane spray, Flying boat spray, Stability (Longitudinal), Measurement.)

Test results are presented of water resistance, trim, heave and stability limits of trim of 8% model hull of the UF-2 seaplane and it's modification with the groove type spray suppressor. (Author)

AD-267 955 Div. 9
(TISTA/SBB) OTS price $13.00

Fluid Dynamics Research Lab., Mass. Inst. of Tech., Cambridge.
SOME STEADY AND UNSTEADY INVISCID HYPERSONIC FLOWS PAST BLUFF BODIES,
by Haim Kennet. June 61, 168p. incl. illus. tables, 50 refs. (MIT Fluid Dynamics Research Lab. rept. no. 61-1)
(Contract AF 49(638)933)
(AFOSR-1031) Unclassified report

DESCRIPTORS: (*Blunt bodies, Shock waves, Superaerodynamics, Hypersonics, *Hypersonic, flow, Axially symmetric flow, Theory, Perturbation theory, Mathematical prediction, Mathematical analysis, Differential equations.) (Boundary layer, Aerodynamic heating, Thermodynamics.)

Both steady and unsteady inviscid fluid motion in detached hypersonic shock layers about axisymmetric bluff bodies are investigated, utilizing a variety of mathematical techniques. Time-dependent flows are determined from a power-series solution of the differential equations-of-change, by postulating small harmonic perturbations superposed on an approximate steady field. The direct problem of chemically reacting and thermally radiating transparent equilibrium air flow in time-independent inviscid shock layers is solved by extending the method of integral relations to non-isoenergetic imperfect gas flows. A two-parameter iteration scheme is developed for the first approximation, where both the shock stand-off distance at the axis and one of the state variables at the stagnation point are found from a singularity condition at the sonic point on the body. A variation principle applicable to three-dimensional time-dependent rotational flows is derived, utilizing the concept of particle functions of which three are required to determine each particle's motion. The possibility of extending the method of integral relations and the variational principle to time-dependent hypersonic flows is discussed. (Author)

AD-268 029 Div. 9
(TISTP/JW) OTS price $3.60

California Inst. of Tech., Pasadena.
A WAKE MODEL FOR FREE-STREAMLINE FLOW THEORY. PART I. FULLY AND PARTIALLY DEVELOPED WAKE FLOWS AND CAVITY FLOWS PAST AN OBLIQUE FLAT PLATE,
by T. Yao-tsu Wu. Sep 61, 26p. illus.
(Rept. no. 97-2)
(Contract Nonr-22035)
Unclassified report

DESCRIPTORS: (*Turbulent flow, Wake, *Gas flow, Fluid mechanics, Theory, Sheets.) (Wing-body configurations, Pressure, Boundary layer.) (Gas flow, Airfoils.) *Perturbation theory.

A wake model for the free-streamline theory is proposed to treat the two-dimensional flow past an obstacle with a wake or cavity formation. The flow is approximately described by an equivalent potential flow such that along the wake boundary the pressure first assumes a prescribed constant under-pressure in a region downstream of the separation points (called the near-wake) and then increases continuously from this under-pressure to the given free stream value in an infinite wake strip of finite width (the far-wake). The boundary trailing a lifting body is allowed to change its slope and curvature at finite distances from the body and is required to be parallel to the main stream only asymptotically at downstream infinity. The pressure varies so that the upper and lower boundaries of the far-wake form a branch slit of undetermined shape in the hodograph plane. (Author)

AD-268 059 Div. 9
(TISTP/MFA) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
A DEVICE FOR DETERMINING GAS VELOCITY,
by A. M. Trokhan. 1 Dec 61, 2p. incl. illus.
(Trans. no. FTD-TT-61-263 of Byulleten' Izobreteniy, Patent no. 134495, No. 24:57-58, 1960)
Unclassified report

DESCRIPTORS: (*Gas flow, Velocity, Particles, Alkali metals, Vapors, *Inventions, Electron beams, Electric discharges.) (Translations, USSR.)

AD-268 061 Div. 9
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
EQUATIONS OF THE FREE-FLOW OF MOLECULES AROUND OBJECTS,
by E. Larish. 30 Nov 61, 13p. incl. illus. (Trans. no. FTD-TT-61-57 of Izvestiya Akademii Nauk SSSR - Otdel. Tekh. Nauk (Mekhanika i Mashinostroyeniye), No. 2:70-77, Mar-Apr 61)
Unclassified report

DESCRIPTORS: (*Cylindrical bodies, *Molecules, *Equations, *Superaerodynamics, *Aerodynamics, Gases, *Gas flow.) (Particles, Surfaces, Reflection, Diffusion, Harmonic oscillators, Temperature, Density, Scattering, Velocity, Relaxation time.) (Functions, Integration, Non-linear differential equations.)

Equations are derived which express stationary and nonstationary flows of rarefied gas around bodies under conditions of free-molecular flow, where it is necessary to take into consideration the repeated reboundings of gas particles from the surfaces of the bodies around which the flow is directed, due to reasons explained. These equations are formulated without imposition of any limitations on the law of reflection. There is described a method of determining the reflective properties of a surface, possessing a certain finely granular structure; an important special case of the reflection law is discussed, representing a combination of diffusional and mirror reflection; a simplified nonstationary instance is examined where nonstationary movements which are superimposed over the stationary ones, appear to be small; and finally we discuss the flow around bodies of a stream, the parameters of which execute small harmonic oscillations around their mean values. (Author)

AD-268 063 Div. 9, 27
(TISTP/TL) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ABOUT THE INFLOW OF GAS INTO A VARIABLE VOLUME CYLINDER,
by B. V. Ovsyannikov. 30 Nov 61, 6p. incl. illus. (Trans. no. FTD-TT-61-53 of Nauchnyye Doklady Vysshey Shkoly Mashinostroyeniye i Priborostroyeniye, No. 2:68-71, 1958)
Unclassified report

DESCRIPTORS: (*Cylindrical bodies, Volume, *Gases, *Gas flow, *Internal combustion engines, *Adiabatic gas flow, Time, Thermodynamics.) (Enthalpy, Heat, Pressure, Specific heat, Motion.) (Differential equations, Integral equations, Integration, Functions.) (USSR, Translations.)

The method of mathematically determining the change in pressure is discussed which can be useful in practice for qualitatively investigating a number of inflow processes in piston engines. It can be applied for example, when calculating the filling of a DVS crankshaft chamber. (Author)

AD-268 064 Div. 9, 19
(TISTM/GEC) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE RELATIVE MERITS OF SOME GAS FILLERS FOR GYRO-MOTOR HOUSINGS,
by A. G. Bessonov. 1961, 12p. incl. illus. tables (Trans. no. FTD-TT-61-19)
Unclassified report

DESCRIPTORS: (*Gyroscopes, Dynamics, *Gases, Vacuum systems, Cooling of Electric motors, Electromagnets.) (Gases, Hydrogen, Helium, Physical properties, Viscosity, Turbulent flow, Thermal conductivity, Convection.) (Technological intelligence, Translations, USSR.)

Air is considered a natural gas filler for gyro-motor housings. In connection with this, other gas fillers are examined. There are two basic requirements for a filler: the lowest aerodynamic resistance to the rotation of the rotor and the best gyro-motor coolant. Hydrogen and helium are the optimum fillers. (Author)

10. FUELS AND COMBUSTION

AD-267 255 Div. 10, 30
(TISTA/SEB) OTS price $8.10

Thompson Ramo Wooldridge Inc., Inglewood, Calif.
RESEARCH AND DEVELOPMENT ON THERMAL STABILITY OF SPECIAL HYDROCARBON FUELS.
Rept. for 1 May 60-31 May 61,
by R. Wolfshagen, H. Braude, and W. Welge.
Nov 61, 80p. incl. illus. tables.
(Contract AF 33(616)7275, Proj. 3048)
(ASD TR 61-266) Unclassified report

DESCRIPTORS: (*Jet engine fuels, Hydrocarbons, Combustion, Temperature, Stability, Thermodynamics, Specific heat, Physical properties, Density, Viscosity, Tests, Test methods, Test equipment.) (Supersonics, Simulation.) Aerodynamic heating.

The thermal stabilities of various fuels for use in Mach 3 to 4 aircraft were evaluated in an aircraft fuel system-engine thermal simulator. Test conditions simulated heat flux and fuel temperature levels anticipated in high Mach aircraft. Included were simulation of heat input from aerodynamic fuel tank heating, hydraulic and lube oil heat exchangers and engine nozzle environment sources. Five JP-6 fuels were tested under simulated Mach 3 conditions, and 5 higher temperature fuels, including several nearly pure hydrocarbons, were tested under simulated Mach 4 conditions. Fuels were rated on the basis of relative change of heat exchanger performance in 50 operating hr. The fuels were rated in the ASTM-CFR Fuel Coker (JP-6 fuels) and the Erdco Research Coker (higher temperature fuels) to compare the test method with simulator results. (Author)

AD-267 311 Div. 10
(TISTM/GEC) OTS price $3.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
FLAME INHIBITION RESEARCH.

Quarterly progress rept. 1 Feb-30 Apr 61. May 61, 18p. incl. illus. tables, 32 refs. (Rept. no. TG 376-2)
(Contract NOrd-7386)

Unclassified report

DESCRIPTORS: (*Flame propagation, *Flames, Inhibition, Fuel additives, Hydrogen compounds, Bromides, Free radicals, Halides, Atoms, Hydrogen, Oxygen, Hydroxides, Methyl radicals, Thermodynamics, Aerodynamics, Reaction kinetics.) (Methanes, Argon, Oxygen, Mixtures, Gases.) Test equipment.

A spherical flame apparatus was set up for inhibition studies on the system (CH_4-0.09, O_2-0.179, Ar -0.727, pressure 0.05atm). Composition profiles were measured for both the inhibited and uninhibited flames with the same total mass flow. In addition to measuring the concentrations of the species which were stable to sampling, an attempt was made to measure hydrogen-atom concentration profiles using a new device, the scavenger sampling probe. The results were: the addition of inhibitor (X(HBr) equals 0.0015) appreciably lowers the rate of reaction of the major species (CH_4, O_1 and CO), peak concentrations of the intermediate species (OCH_2, CO and H_2) are changed and shifted relative to the major species, the apparent concentration of H atoms was depressed almost five-fold by the addition of HBr even in the equilibrium region and HBr was the only bromine containing compound detected (X(Br_2) less than 10 to the minus 4th power). Computer calculations were made of the adiabatic temperature and composition of the equilibrium burned gases of some CH_4 -O_2 -Ar mixtures and the effect of adding small amounts of HBr. (Author)

AD-267 312 Div. 10
(TISTM/GEC) OTS price $3.60

Applied Physics Lab., Johns Hopkins U., Silver Spring, Md.
FLAME INHIBITION RESEARCH.
Quarterly progress rept., 1 May-31 July 61, by R. M. Fristrom. Aug 61, 18p. incl. illus. tables, 31 refs. (Rept. no. TG 376-3)
(Contract NOrd-7386)

Unclassified report

DESCRIPTORS: (*Flame propagation, *Flames, Inhibition, Fuel additives, Methanes, Oxygen, Hydrogen compounds, Bromides, Free radicals, Atoms, Halogens, Oxygen, Hydroxides, Methyl radicals, Thermal diffusion, Thermodynamics, Aerodynamics, Reaction kinetics, Transport properties, Microstructure.) (Ethylenes, Fluorides, Polymers, Glass, Ceramic materials.)

Composition and temperature profiles were determined for a flat methane-oxygen flame (CH_4 - 0 0.078, O_2 - 0.02, P equals 0.05 atm) with and without added HBr. Corrosion was so severe that the burner assembly became unusable. A new teflon-glass-ceramic system including traps to protect the pumps has been designed and is being fabricated. A program to measure the high-temperature diffusion coefficients for the analysis of the inhibited flames has been started. The apparatus has been activated and tested at 300 and 500 K on the well-known He-N_2 system. Measurements have been started on the Ar-H_2 system. Scavenger probe studies of radical concentrations in flames have been continued. The use of chlorinated hydrocarbons as scavenger for H atoms has been shown to be proportional to H, but the scavenging efficiency was found to be only 10%. Studies of O-atom concentration using NO_2 as a scavenger were made. (Author)

AD-267 331 Div. 10
(TISTA/SEB) OTS price $7.60

Thiokol Chemical Corp., Elkton, Md.
A RESEARCH STUDY TO ADVANCE THE STATE-OF-THE-ART OF SOLID PROPELLANT GRAIN DESIGN.
Quarterly progress rept. no. 7, 1 June-1 Sep 61. 13 Oct 61, 61p. incl. illus. tables (Rept. no. E156-61)
(Contract AF 33(616)6530, Proj. 3059)

Unclassified report

DESCRIPTORS: (*Solid rocket propellants, *Propellant grains, Surfaces, Combustion, Configuration, Photoelasticity, Stresses, Heat transfer, Theory, Tests, Mathematical analysis, Statistical analysis, Equations, Analog computers, Programming, Design.) (Solid rocket propellants, Reliability in Rocket motors, Combustion.) (Test methods, Test equipment.)

Four approaches for incorporating head and aft-end effects on burning surfaces into the computer program, previously described were evaluated. A modified Quasi-Two-Dimensional approach, in which the initial head-end three dimensional burning surface is approximated by a number of planes, and the burning of each of these planes is then evaluated, was selected. The effects of aft-end burning are considered by adapting the present straight-through grain evaluation computer program at the aft-end to consider a variable propellant outside diameter. Photostress evaluations of engine grain designs having star and cylindrical perforated configuration with similar web ratios are described. Results obtained from applying a theoretical elastic analysis to the engine grains used in the Photostress study are reported. An experimental program to determine the effects of propellant defects on engine performance is described. Heat transfer studies were performed to duplicate numerically and by electrical analog the actual thermal conditioning history of an engine grain for which experimental thermal response data was obtained. (Author)

AD-267 422 Div. 10, 25
(TISTP/WH) OTS price $22.25

Solid Propellant Information Agency, Applied Physics Lab. (JHU), Silver Spring, Md.
20TH MEETING BULLETIN. JOINT ARMY-NAVY-AIR FORCE-ARPA-NASA PANEL ON PHYSICAL PROPERTIES OF SOLID PROPELLANTS. VOLUME I. NOVEMBER 14-16, 1961, RIVERSIDE, CALIFORNIA.
Nov 61, 409p. incl. illus. tables.
(Contract NOrd-7386)

Unclassified report

DESCRIPTORS: (Propellants, *Solid rocket propellants, *Physical properties, Conferences.) (Propellants, *Solid rocket propellants, Mathematical analysis, *Mechanical properties, Test methods, Volumetric analysis, Failure (Mechanics), Physical chemistry.) (Viscosity, Elasticity, Stresses, Deformation, Heat transfer, Vibration, Rocket motors, Tensile properties.) Symposia.

AD-267 449 Div. 10
(TISTA/SEB) OTS price $1.60

Texaco Experiment Inc., Richmond, Va.
COMBUSTION OF ELEMENTAL BORON.

Quarterly summary rept., May-July 60,
by Claude P. Talley. 1 Aug 60, 13p. incl. illus. table (Rept. no. TM-1269; EXP 223)
(Contract Nonr-188300)
Unclassified report

DESCRIPTORS: (*Boron, Combustion in Oxygen, Air, High temperature research, Tests.)

The effect of gas velocity, O concentration, and physical size of B on the combustion of elemental B at 2300 K and above in pure O and in O diluted with N and Ar was experimentally investigated. The results were interpreted on the basis of an O-diffusion-controlled mechanism. On this basis excellent agreement was obtained between theoretically calculated and experimentally determined combustion rates. This study resulted in obtaining conditions for the successful self-propagating combustion of B in air. (Author)

AD-267 505 Div. 10
(TISTP/JW) OTS price $8.10

Dow Chemical Co., Midland, Mich.
A GENERAL METHOD FOR CALCULATING THE SPECIFIC IMPULSE OF HIGH ENERGY PROPELLANT MIXTURES.
Rept. on Advanced Research on Solid Rocket Propellants,
by Carlos M. Bowman and Russell H. Foy. 1 Aug 61, 83p. incl. illus. tables (Rept. no. AR-3S-61)
(Contract AF 33(616)6149)
(ARPA Order no. 24-61)
Unclassified report

DESCRIPTORS: (*Solid rocket propellants, *Specific impulse, Mathematical analysis.) (Thrust, Measurement.) (Computers, Programming, Matrix algebra.) (Combustion chamber gases, Velocity, Temperature, Enthalpy, Entropy.) Tables.

Methods are described for calculating specific impulses of propellant mixtures. The capacity of the computer (Burroughs 220) and the availability of thermodynamic data place practical restrictions on what systems can be calculated. The calculations center around the method of White, Johnson, and Dantzig for determining the equilibrium compositions of complex mixtures. By developing and applying matrix equations which describe both the thermodynamic data and the physical equations, the programming effort was reduced. Required input data to the program are the composition of the reaction mixture, the chamber and exit pressures, and a rough estimate of the chamber temperature. All other pertinent data are retrieved from magnetic tape by the computer program. A large number of problems may be solved without manual intervention. In addition to the specific impulse, the program calculates the characteristic velocity, the chamber and exit temperatures, compositions, enthalpies and entropies. (Author)

AD-267 782 Div. 10, 4
(TISTM/TCG) OTS price $2.60

Little, Arthur D., Inc., Cambridge, Mass.
LONG-TERM STORAGE OF LIQUID OXYGEN.
18 July 58, 24p. incl. illus. tables (Special rept. no. 85; Rept. no. C-59879)
(Contract AF 04(647)130; Continuation of Contract AF 04(645)34)
Unclassified report

DESCRIPTORS: (Storage, *Oxygen, Liquefied gases, Liquid rocket propellants, Hazards, Evaporation.) (Contamination from Acetylenes, Ethylenes, Methanes.) (Purification, Absorption by Silicon compounds, Dioxides, Gels, Chemical reactions, Fluorine.)

When liquid O is stored, the only real hazard is presented by the gradual accumulation of acetylene over a long period of time. If on-site storage tanks were filled and topped off with liquid O that had 0.5 ppm or less acetylene, the continuous increase in acetylene concentration would not become hazardous for 3 yr. The effect depends not on the size of the storage facility, but rather on heat-leak losses. The 3 yr safety period assumes a heat-leak loss of 0.4%/C day. There are 2 excellent ways to extend the period of safe operation. The first method prevents acetylene build-up by purifying the liquid O introduced into the storage tank during the topping operation. The storage tank should be filled initially with liquid O containing 0.5 ppm of acetylene. Thereafter, each monthly addition should be passed through a 14-lb silica-gel bed at a flow rate of 700 gph, thereby eliminating acetylene and ethylene from the added liquid oxygen. The second method uses small quantities of F. We believe that less than 0.5% of F added to the liquid O entering the tank would react preferentially with acetylene, and form inert, soluble freons. (Author)

AD-267 915 Div. 10, 12
(TISTW/JRG) OTS price $3.60

Princeton U., N. J.
ABSTRACTS OF PAPERS. FOURTEENTH AFOSR CONDUCTORS' MEETING ON LIQUID ROCKET COMBUSTION RESEARCH, 25-26 SEPTEMBER 1961.
26 Sep 61, 25p.
(Contract AF 49(638)936)
(AFOSR-1768)
Unclassified report

DESCRIPTORS: (Rocket research, Symposia, *Liquid rocket propellants, Rocket motors, *Combustion, Stability, High frequency, Oscillation, Combustion chamber gases, Electrical effects, Mathematical analysis.) (Rocket research, Solid rocket propellants, Stability, Combustion.)

AD-267 917 Div. 10, 27
(TISTM/TCG) OTS price $1.60

Research Information Service, New York.
USE OF NEUTRALIZING COMPOUNDS IN DIESEL ENGINES OPERATING ON SULFUR-RICH FUEL,
by B. V. Losikov, M. S. Smirnov and others.
1961, 11p. incl. illus. tables (Trans. no. E-826 and T-10 of Khimiya i Tekhnologiya Topliv i Masel, No. 2:46-52, 1961)
Unclassified report

DESCRIPTORS: (*Diesel engines, *Fuels, Sulfur compounds, *Fuel additives, Neutralization by Amines, Ammonium radicals, Carbonates, Ammonia, Effectiveness on Deposits, Carbon deposits, Corrosion, Tests.) (USSR, Translations.) Oxidation, Free radicals, Corrosion inhibition.

Prolonged engine tests were made on diesel oil

containing 1.25% S to which 0.5 to 0.8% of a mixture of organic amines reduced the corrosion-induced wear and the deposition of gum only when used at a rate of 0.8 to 1.0% which is too high for practical value. Tests made with fuels containing 1.25 to 1.6% S and additions of 20% aqueous $(NH_4)_2CO_3$ (0.03% of the fuel) reduced wear and inhibited the deposition of gum. The processes responsible for gum and other deposits are partly accelerated by the SO_3 content. The suppression of SO_3 by NH_3 was confirmed and points out an entirely new direction in studies on the use of S-rich fuels.

AD-267 933 Div. 10, 27, 30
(TISTW/EET) OTS price $3.60

Broadview Research Corp., Burlingame, Calif.
HIGH TEMPERATURE DYNAMIC PRESSURE GAUGE.
Final rept. by Kenneth Kaplan and Thomas C. Goodale. Nov 61, 33p. incl. illus. table
(Rept. no. BRC 176-1)
(Contract DA 49-146-xz-066)
(DASA-1258)
Unclassified report

DESCRIPTORS: (Solid rocket propellants, Loaders, Rocket motors, *Pressure gauges for rocket motors, Calibration, Design of rocket motors.) (Pressure gauges in shock tubes, Heat, Thermocouples, Tests of pressure gauges.) (Pressure, Measurement in supersonic flow, Temperature.)

Contents:
- Gauge design
  - Heat considerations
  - Balancing considerations
  - Other design considerations
- Gauge evaluation and final gauge design
  - Transient heating tests
  - Shock tube tests - Gauge DQ-1
  - Shock tube tests - Gauge DQ-2
- Tests in the SWRI loader

AD-268 034 Div. 10, 25, 27
(TISTM/TCG) OTS price $4.60

Aerojet-General Corp., Azusa, Calif.
KINETICS OF ENERGETIC SPECIES AT LOW TEMPERATURES.
Final rept., 1 Oct 59-30 Sep 61,
by Henry S. Judeikis, Max K. Barsh, and others.
Nov 61, 34p. illus. 46 refs. (Rept. no. 2121)
(Contract AF 18(603)110, Proj. 9750)
(AFOSR-1758) Unclassified report

DESCRIPTORS: (Rocket propulsion, *Rocket fuels, Reaction kinetics, *Free radicals, Low temperature research, Stabilization, Paramagnetic resonance.) (Gamma rays, Beta particles, Ultraviolet radiation, Ice, Ethyl radicals, Bromides, Methyl radicals, Iodides, Alcohols, Hydrazines, Fluorides.) (Ions, Hydroxides, Hydrogen.) Tetrazenes.

Research on the stabilization and chemical reactions of energetic free radicals is summarized. Studies were made on the irradiation of ice, solid N_2F_4, solid NH_3, EtBr, MeI, MeOH, and tetramethyltetrazene. H atoms, OH radicals, and other normally unstable chemical species produced by ionizing radiation and by electric charges were stabilized at low temperature and investigated. The disappearance of OH in irradiated ice at 100 K followed a 3/2-order reaction rate law; the activation energy is 6 kcal/mole. H atoms produced by irradiation of wet pyrex recombined rapidly at 100 K and followed a second-order reaction rate law with an activation energy of 4 kcal/mole. Tests designed to trap NH_2 radicals at 77 K yielded inconclusive results. Stabilization of H atoms was observed on the surfaces of quartz vessels used for UV studies of MeI, MeOH and tetramethyltetrazine. The rates of formation and disappearance of some of these radicals were measured by electron paramagnetic-resonance techniques.

AD-268 073 Div. 10, 14
(TISTA/SEB) OTS price $15.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AVIATION AND ROCKET FUELS AND LUBRICANTS (Aviatsionnyye i Raketnyye Topliva i Smazochnyye Materialy),
by M. Ye. Reznikov. 29 Nov 61, 229p. incl. illus. tables (Trans. no. MCL-1352/1+2 of Voyennoye Izdatel'stvo Ministerstva Oborony Soyuza SSR Moskva, pp. 1-207, 1960)
Unclassified report

DESCRIPTORS: (*Aviation fuels, Fuels, Gasoline, Jet engine fuels, *Rocket fuels, Rocket propellants, Liquid rocket propellants, Solid rocket propellants, Rocket oxidizers.) (*Greases, Oils, *Lubricants, Hydraulic fluids, Hydraulic gear fluids, Hydraulic oils, Airplane engine oils.) (Preparation, Production, Handling, Storage, Combustion, Specific impulse.) (*Translations, Technological intelligence, USSR.) De-icing materials.

The book presents basic information on the energy, physical-chemical, and operating properties of fuel for gas turbine, rocket, and other modern aviation engines, and for aviation lubricating oil, lubricating greases, and special fluids. Problems relating to the handling and quality control of fuels and lubricants are discussed. A brief description is given of the most important methods for producing fuels and oils; some data is presented for promising fuels and oils. (Author)

11. GROUND TRANSPORTATION EQUIPMENT

AD-267 207 Div. 11
(TISTE/CDM) OTS price $3.60

Army Transportation Board, Fort Eustis, Va.
NODWELL CARRIER RN 110. PHASE I: SUBARCTIC EVALUATION.
Final rept. on Phase 1.
Nov 61, 29p. incl. illus. (Rept. no. TCB-61-047-EV)
Unclassified report

DESCRIPTORS: (*Tracked vehicles, *Snow vehicles, *Cargo vehicles, Arctic regions, Tests, Military requirements.)

An evaluation of the Nodwell carrier RN 110 was

made by the U. S. Army Transportation Board during an army field exercise, a phase of Exercise Willow Freeze which was a semicontrolled maneuver conducted in Alaska in the winter of 1960-61. The Nodwell carrier RN 110 is a tracked cargo carrier with a carrying capacity of 11,000 pounds. It was designed primarily for year-round, off-road operation over muskeg or other adverse terrain. In this exercise, the vehicle was used to provide close-in logistical support. (Author)

12. GUIDED MISSILES

AD-267 162 Div. 12
(TISTW/JRG) OTS price $4.60

General Dynamics/Astronautics, San Diego, Calif.
SM-65D AND MODEL 55 ATLAS AND CENTAUR BOOSTER TELEMETERING SYSTEM ACCEPTANCE PROCEDURE,
by C. B. Foster. 6 Mar 61, 30p. (Rept. no. 27-92028-1)

Unclassified report

DESCRIPTORS: (*Guided missiles, Surface to surface, Booster rockets, Satellite vehicles, *Ground support equipment, *Telemetering systems, Tests, Test methods.)

Instructions are provided for conducting a final checkout of the complete telemetering system on an assembled missile and is to be used in conjunction with the 27-5072 telemetering checkout trailer. This checkout is required: (1) upon completion of installation of the telemetering system on missiles covered by this procedure; (2) following alteration or repair of any part of the telemetry system (only checkout portion affected); and/or (3) following any relocation or disturbance of missiles covered by this procedure. (Author)

AD-267 199 Div. 12
(TISTW/JRG) OTS price $3.60

Acoustica Associates, Inc., Los Angeles, Calif.
SPECIFICATION FOR AEROSPACE GROUND EQUIPMENT PROPELLANT UTILIZATION SUBSYSTEM MODEL PU 136, WS107A-1 WEAPON SYSTEM SM 65 F SERIES, SILO LIFT, MISSILE.
15 May 61, 32p. incl. illus. tables (Rept. no. DO 5389B, supercedes rept. no. DO 5389A)
(Contract AF 04(647)625)

Unclassified report

DESCRIPTORS: (*Specifications, *Ground support equipment, Handling of Rocket propellants of Rocket oxidizers, *Guided missiles, Surface to surface.) (*Specifications, *Ground support equipment, Guided missiles, *Fuel systems, Surface to surface.)

The Propellant Utilization Subsystem (PUS), composed of 2 sensor stillwell assemblies (fuel and liquid oxygen) and an analog computer, is a propellant management system providing for the simultaneous emptying of both missile propellant tanks. The outlined factory-to-launch sequence requires various serviceability and verification tests at specific locations. To accomplish these tests, Acoustica Associates, Inc. has developed Aerospace Ground Equipment, thereby ensuring that the end result of maintaining its PUS in the first readiness state is achieved. (Author)

AD-267 200 Div. 12
(TISTW/RD) OTS price $1.60

Autonetics, Downey, Calif.
QUALIFICATION TEST SPECIFICATION AND TEST PROCEDURE FOR C24A MISSILE TARGETING SET.
30 June 61, 15p. incl. illus. table (Rept. no. EM-2761)
(Contract AF 04(647)923)

Unclassified report

DESCRIPTORS: (*Guided missiles, Surface to surface, Tests, Vibration, Impact shock, Temperature, Humidity, Instrumentation, Fungus deterioration, Test methods, Test equipment, Specifications.)

AD-267 202 Div. 12
(TISTW/JRG) OTS price $2.60

Acoustica Associates, Inc., Los Angeles, Calif.
PROPELLANT UTILIZATION SUBSYSTEM MODEL PU 136 QUALIFICATION TEST SPECIFICATION FOR,
by N. Samuels. 22 Mar 61, 23p. incl. illus. table (Rept. no. DO 5369)
(Contract AF 04(647)625)

Unclassified report

DESCRIPTORS: (Airborne, Guided missiles, Surface to surface, *Fuel systems, Tests.) (*Guided missiles, Surface to surface, Handling, Rocket propellants, Rocket oxidizers, Tests.) *Specifications.

This specification covers the qualification test requirements for the Acoustica Associates, Inc. Propellant Utilization (PU) Subsystem, model PU 136, operational airborne items, for the WS107A-1 weapons system. (Author)

AD-267 226 Div. 12
(TISTW/JRG) OTS price $1.10

Lockheed Aircraft Corp., Sunnyvale, Calif.
NASA REPORTS BIBLIOGRAPHY.
Rept. for period ending Apr 61.
28 Apr 61, 7p. (Rept. no. LMSD-448135; SSN-T61-14)
(Contract AF 04(647)592)

Unclassified report

DESCRIPTORS: (*Bibliography of Astronautics, *Satellite vehicles, Rocket propellants, Ground support equipment, Lunar probes, Research program administration, Scheduling.)

This bibliography of NASA reports also contains contributions from the Lockheed Missiles and Space Division, as well as some subcontractors. This issue of the bibliography presents 51 titles, covering the period up to Apr 1961. A subject index is provided. The bibliography provides such information as rept. no., title, program, originator, and security classification for each item.

Division 12 - GUIDED MISSILES

AD-267 325 Div. 12, 15, 30
(TISTP/MFA) OTS price $2.25

North American Aviation, Inc., Columbus, Ohio.
PASSIVE AERODYNAMIC ATTITUDE STABILIZATION OF NEAR EARTH SATELLITES. VOLUME III. MATHEMATICAL TECHNIQUES AND COMPUTER PROGRAM.
Rept. on A Study of Aerodynamically Oriented and Stabilized Satellites,
by O. C. Juelich. July 61, 94p. incl. illus.
(Contract AF 33(616)7100, Proj. 1366)
(WADD TR 61-133, vol. 3)
Unclassified report

DESCRIPTORS: (*Satellite vehicle research, Satellite vehicles, Satellite attitude, Orbital flight paths, Aerodynamics, Stabilization.) (*Mathematical analysis, Numerical methods and procedures, Mathematical logic, Differential equations, Integration.) Computers, *Data processing systems, Data storage systems, Programming, Punched card methods.)

A computer program is presented which integrates numerically the pitch equation of an aerodynamically stabilized satellite. The mathematical theory of the linear second order equation with periodic coefficients and the integration procedure are discussed to clarify the structure and application of the program. (Author)

AD-267 450 Div. 12, 1, 9
(TISTA/WAW) OTS price $1.60

David Taylor Model Basin, Washington, D. C.
AIRCRAFT STORE TRAJECTORIES PREDICTED FROM WIND-TUNNEL INVESTIGATIONS COMPARED WITH FULL-SCALE FLIGHT RESULTS.
by Millard J. Bamber. July 61, 10p. incl. illus. table (Aero rept. no. 1011)
Unclassified report

DESCRIPTORS: (Attack bombers, Jet planes, *Guided missiles, Air to air, Wind tunnel models, Mathematical prediction, Mathematical analysis, *Guided missile trajectories, Model tests, Flight testing.)

Some full-scale aircraft missile trajectory characteristics following launch from an airplane are compared with those predicted from wind-tunnel investigations. The predicted characteristics for the three available trajectories are believed to be in as good agreement as could be expected and for some factors, much better. (Author)

AD-267 471 Div. 12, 9
(TISTA/WAW) OTS price $1.00

National Aeronautics and Space Administration, Washington, D. C.
ATMOSPHERE ENTRIES WITH VEHICLE LIFT-DRAG RATIO MODULATED TO LIMIT DECELERATION AND RATE OF DECELERATION - VEHICLES WITH MAXIMUM LIFT-DRAG RATIO OF 0.5,
by Elliott D. Katzen and Lionel L. Levy, Jr.
Dec 61, 34p. incl. illus. (Technical note no. D-1145)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-1145.

DESCRIPTORS: (Spaceships, Hypervelocity vehicles, Manned, *Re-entry vehicles, Atmosphere entry, *Deceleration, Modulation, *Re-entry aerodynamics, Lift, Drag, Flight paths, Aerodynamic heating, Heat transfer, Mathematical analysis.)

An analysis has been made of atmosphere entries for which the vehicle lift-drag ratio was modulated to maintain specified maximum decelerations and/or maximum deceleration rates. The part of the vehicle drag polar used during modulation was from maximum lift coefficient to minimum drag coefficient. The entries were at parabolic velocity and the vehicle maximum lift-drag ratio was 0.5. Two-dimensional trajectory calculations were made for a nonrotating, spherical earth with an exponential atmosphere. The results of the analysis indicate that for a given initial flight-path angle, modulation generally resulted in a reduction of the maximum deceleration to 60% of the unmodulated value or a reduction of maximum deceleration rate to less than 50% of the unmodulated rate. These results were equivalent, for a maximum deceleration of 10g, to lowering the undershoot boundary 24 miles with a resulting decrease in total convective heating to the stagnation point of 22%. The maximum convective heating rate was increased 18%. (Author)

AD-267 472 Div. 12
(TISTW/JRG) OTS price $1.60

Naval Ordnance Lab., Corona, Calif.
TEST SET FOR FUZE, GUIDED MISSILE, MK 312 MODS 1 AND 2. DESCRIPTION, OPERATION, AND MAINTENANCE.
1 Nov 61, 14p. incl. illus. table.
(WepTask Assignment RM3753-005/211-1/W024A0-003)
(NAVWEPS Rept. no. 7186)
Unclassified report

DESCRIPTORS: (*Guided missile fuzes, Guided missiles, Air to surface, Test equipment, Test sets.) (Test sets, Test equipment for Measurement, Resistance in Guided missile fuzes, Electric fuzes, Time delay fuzes.)

A description of the test set for the Mk 312 Mods 1 and 2 fuze and instructions for its operation and maintenance is presented. The test set is used in factory acceptance testing and in depot integration of the fuze with the Mk 19 Mod 0 and Mk 40 Mod 0 warheads of the BULLPUP guided missile. (Author)

AD-267 480 Div. 12, 22
(TISTW/EET) OTS price $10.50

Aircraft Armaments, Inc., Cockeysville, Md.
DESIGN AND DEVELOPMENT OF A FORCED RADIAL EJECTION WARHEAD.
Final rept.,
by R. R. Mills, Jr., J. S. Wilkinson, and W. L. Black. 27 Nov 61, 123p. incl. illus. tables, 13 refs. (Rept. no. ER-2535)
(Contracts DA 18-108-cml-6091 and DA 18-108-405-cml-286)
Unclassified report

DESCRIPTORS: (Guided missiles, Surface to surface, *Guided missile warheads of *Ejector cartridges, Design, Simulation, Flight testing.) (Guided missile warheads, Bomb clusters, Propellants, Gas generating systems, Ejector cartridges, Model tests.) Guided missile warheads, Ejection, Aerodynamic heating, Guided missile warheads, Mathematical analysis, Structures, Aerodynamics, Flight testing.

The purpose of radial ejection is to impart to the bomblet payload at warhead opening, a component of radial velocity that will place the

bomblets outside the radius of the missile fins before the fins pass through the cloud of released bomblets. The Sergeant warhead was used as the test vehicle since it represents the performance available in current missiles. Efforts and results relating to the following items are discussed: detail design, structural analysis, aerodynamic heating, ejector design theory, static test firings, and flight tests. The theory of the radial ejector is developed and relationships established that would be applicable to the design of other warheads using this principal. Conclusions are that the program establishes the concept as being practical. (Author)

AD-267 520 Div. 12, 13, 14
(TISTA/SEB) OTS price $16.50

Northern Research and Engineering Corp., Cambridge, Mass.
ENGINEERING STUDY OF VAPOR CYCLE COOLING EQUIPMENT FOR ZERO-GRAVITY ENVIRONMENT.
Rept. for 1 Oct 59-31 Aug 60,
by Thomas Blatt, Kymus Ginwala and others.
Jan 61, 247p. incl. illus. tables, 195 refs.
(Contract AF 33(616)6783, Proj. 0(15-6146))
(WADD TR 60-776) Unclassified report

DESCRIPTORS: (Satellite vehicles, Space probes, *Spaceships, Vapors, Cooling, *Refrigeration systems, *Coolants, *Refrigerants, Design, Weightlessness, Thermodynamics, Enthalpy, Entropy, Theory, Mathematical analysis.) (Heat exchangers, Heat transfer, Thermal radiation.)

An analytical and experimental study was performed of space vehicle vapor cycle cooling systems operating in a zero-gravity environment. The evaporator temperature varied from 40 to 55 F, and the condenser temperature varied between 150 and 250 F; the evaporator cooling load varied from 400 to 4000 BTU/min. The ultimate heat dissipation is by radiation to space. The operation of a vapor cycle in a zero-gravity environment was considered with emphasis on the vapor-liquid separation problems in evaporation and condensation. The vortex evaporator is presented as a solution to the zero-gravity evaporation problem. The spiral condenser is presented as a solution to the zero-g condenser problem. An analysis for and design of a rotating condenser is shown. Wick materials are well suited to zero-gravity evaporators. Film condensation under zero gravity in the laminar region is also analyzed. For vapor cycles operating at large differences in condenser and evaporator temperature, the substitution of an expansion engine for the throttle valve results in a significant improvement in the cycle performance. (Author)

AD-267 521 Div. 12, 9
(TISTA/SEB) OTS price $3.00

North American Aviation, Inc., Columbus, Ohio.
PASSIVE AERODYNAMIC ATTITUDE STABILIZATION OF NEAR EARTH SATELLITES. VOLUME I. LIBRATIONS DUE TO COMBINED AERODYNAMIC AND GRAVITATIONAL TORQUES.
Rept. on A Study of Aerodynamically Oriented and Stabilized Satellites,
by D. M. Schrello. July 61, 146p. incl. illus.
(Contract AF 33(616)7100, Proj. 1366)
(WADD TR 61-133, vol. 1) Unclassified report

DESCRIPTORS: (*Satellite vehicles, Configuration, *Aerodynamic configurations, Design, Orbital flight paths, *Satellite attitude, Stabilization Stability, Stability (Lateral), *Stability (Longitudinal), Torque, Celestial mechanics, Gravity, Aerodynamics, Yaw, Pitch, Mathematical analysis, Fourier analysis, Computers, Theory.)

The general equations governing the angular motion of a rigid satellite are investigated for the case where both gravitational and aerodynamic torques are included, and where the atmosphere is assumed to be spherically symmetric but rotating. For a non-spinning, axisymmetric satellite, the vehicle is characterized by 3 dimensionless aerodynamic parameters and one inertia parameter. A Fourier series expansion of the coefficients of the equations gives equations of the non-homogeneous Hill type. The complete equations of motion are solved for a circular orbit. Atmospheric rotation induces a steady-state yawing motion preventing yaw equilibrium from being achieved for other than equatorial orbits. The effects of configuration and orbit parameters are examined. Gravity gradients generally will not dominate until altitudes of 300-400 mi are achieved. At lower altitudes small amounts of aerodynamic stability suffice to override the gravitational torques. (Author)

AD-267 522 Div. 12, 9
(TISTA/SEB) OTS price $3.00

North American Aviation, Inc., Columbus, Ohio.
PASSIVE AERODYNAMIC ATTITUDE STABILIZATION OF NEAR EARTH SATELLITES. VOLUME II. AERODYNAMIC ANALYSIS.
Rept. on A Study of Aerodynamically Oriented and Stabilized Satellites,
by Paul H. Davison. July 61, 152p. incl. illus. tables.
(Contract AF 33(616)7100, Proj. 1366)
(WADD TR 61-133) Unclassified report

DESCRIPTORS: (*Satellite vehicles, *Aerodynamic configurations, Configuration, Design, *Satellite attitude, Stabilization, Stability, Stability (Lateral), Stability (Longitudinal), Motion, Torque, Gravity, Aerodynamics, Drag, Pitch, Damping, Theory, Mathematical analysis.)

Aerodynamic drag and stability coefficients of several simple satellite configurations are calculated using nearly exact, free molecule theory. The models are the cylinder, sphere, pointed cone, truncated cone, power law body, hemisphere-cylinder and cone-cylinder. For maximum aerodynamic effects, favorable center-of-mass locations are obtained by concentrating a homogeneous payload forward of the center-of-volume. Aft portion of the models were assumed to be rigid, but massless, shells or skirts. Based upon the analysis of satellite angular motion, aerodynamic pitching moment slope is combined with the pitching moment of inertia to form a stability parameter which, when maximized, describes the optimum external geometry of each model for a specified payload mass distribution. The optimum configurations are shown to have low fineness ratios (order of unity), permitting the gravitational torque to augment the aerodynamic torque. Pointed and truncated conical bodies and the power law bodies were the most stable. (Author)

AD-267 579 Div. 12
(TISTW/RD) OTS price $3.60

General Dynamics/Astronautics, San Diego, Calif.
XSM-65D. MOD III G GUIDANCE SYSTEM ACCEPTANCE PROCEDURE,
by R. R. Whittemore. 13 Mar 61, 38p. (Rept. no. 27-92353-1; N/A 27-95000)
Unclassified report

DESCRIPTORS: (*Guided missiles, Surface to surface, Guidance of Military requirements.) (*Guidance of Test equipment of Tests, Calibration, Electronic equipment.)

Division 12 - GUIDED MISSILES

AD-267 625 Div. 12
(TISTE/CCD) OTS price $5.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
MINIMUM-WEIGHT ANALYSES FOR TRUSS-CORE SANDWICH CYLINDRICAL SHELLS UNDER AXIAL COMPRESSION, TORSION, OR RADIAL PRESSURE,
by R. F. Crawford and C. E. Stuhlman. Apr 61, 55p. incl. illus. 11 refs. (Rept. no. 2-47-61-2) (Contract AF 33(616)6905)
Unclassified report

DESCRIPTORS: (*Guided missiles, *Aerodynamic configurations, Structural shells, Structures, Mathematical analysis, Design.) (*Structural shells, *Cylindrical bodies, Sandwich construction, Load distribution, Stresses, Pressure, Stability.)

Minimum-weight analyses and design charts are developed for truss-core sandwich cylindrical shells under uniform axial compression, torsion, or uniform radial crushing pressure. The analyses account for load-carrying ability of the core wherever appropriate and for plasticity effects in the case of uniform axial compression. Examples of problems are given. (Author)

AD-267 667 Div. 12, 7
(TISTW/RD) OTS price $3.60

White Sands Missile Range, N. Mex.
NIKE-HERCULES. NIKE SYSTEM 45-KW MOTOR GENERATOR INVESTIGATION,
by John W. Goodwin. Nov 61, 32p. incl. illus. table (Technical memo. no. 925)
Unclassified report

DESCRIPTORS: (*Guided missiles, Surface to air, Reliabilfty during Launching.) (*Motor generators, Failure (Mechanics) of Electric relays, Tests.) (Electric relays, Vibration through Failure (Mechanics).)

An investigation was performed to determine the causes for tactical operational failures of the 45-kw motor-generator used to supply 400-cycle power for firing Nike-Hercules and Nike Ajax missiles. The motor generator was instrumented to obtain vibration data and sound pressure levels during missile launching. The investigation showed that the acoustic environment produced by the missile at launch, caused relay malfunction making the motor generator inoperactive until restarted manually. The chief conclusion was that the relays used in the motor generator are inadequate for use while exposed to the acoustic environment produced by missile launchings. It is recommended that these relays be replaced with heavy duty relays, and that suitable vibration dampening be provided on the relay mounting panel. (Author)

AD-267 713 Div. 12
(TISTA/SEB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
GUARDIANS OF THE SKY (A REPORT FROM A MISSILE RANGE),
by A. Salutskiy. 21 Nov 61, 6p. incl. illus. (Trans. no. FTD-TT-61-148 of Komsomol'skaya Pravda, No. 226 (11166) pp. 4, 23 Sep 61)
Unclassified report

DESCRIPTORS: (*Guided missiles, Surface to air, *Guided missile launchers, *Guided missile personnel, Technological intelligence, Translations, USSR.)

AD-267 729 Div. 12, 6
(TISTA/VGW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE DYNAMICS OF A GYRO-STABILIZER, CORRECTED BY A DIGITAL COMPUTER,
by V. A. Besekerskiy and V. V. Solov'ev. 17 Nov 61, 15p. incl. illus. (Trans. no. FTD-TT-61-130 of Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Energetika I Avtomatika 6:113-122, 1960)
Unclassified report

DESCRIPTORS: (Mathematical analysis of Dynamics of *Gyro stabilizers with Digital computers, Corrections for Automatic, Control systems, Stability.) (Technological intelligence, Translations, USSR.)

Corrected gyro stabilizers find wide use in automatic control systems. Lately, digital computers (DC) are being used in correction circuits, since a mass of mathematical calculations (coordinate transformation, etc.) must be made in correction. In connection with this a study of the joint operation of a gyro stabilizer (GS) and a digital computer is of interest. The study is made with the assumption that in a system with a DC, quantization of signal level can be ignored, taking into account only quantization of duration. This assumption, correct when the computer operates with a sufficient number of places, allows the system to be investigated as if it were a pulse system. (Author)

AD-267 751 Div. 12, 2
(TISTA/VGW) OTS price $2.60

The RAND Corp., Santa Monica, Calif.
PROBABILITY THAT A METEORITE WILL HIT OR PENETRATE A BODY SITUATED IN THE VICINITY OF THE EARTH,
by G. Grimminger. 22 Apr 48, 26p. incl. illus. tables (Rept. no. P-18)
Unclassified report

DESCRIPTORS: (Space flight, Hazards to Satellite vehicles, Spaceships from *Meteorites in Earth, Atmosphere, Upper atmosphere, Ionosphere, Mathematical prediction.) (Terminal ballistics, Vulnerability, Penetration of Metal plates, Stainless steel by Meteorites.) (Meteorites, Atmosphere entry, Frequency, Velocity, Probability.)

When a body is situated at sufficiently great altitudes (about 200 km or above) it is exposed to impact by the meteorites which enter the earth's atmosphere. A preliminary attempt is made to estimate the probability that a body situated in the vicinity of the earth will be hit by a meteorite and, when hit does occur, to estimate the metal plate thickness necessary to prevent perforation by the impact of meteorites of different sizes. For stainless steel skin thicknesses ranging from 0.05 to 0.02 inch it is necessary to consider meteorites as small as those corresponding to magnitude 8 to 11, respectively. In general, it is found that for meteorites which are large enough to present a perforation hazard the probability of a hit is negligibly small, particularly if the body is not exposed to meteoritic impact for excessively long periods of time. (Author)

AD-267 766 Div. 12
(TISTA/VGW) OTS price $8.10

RAND Corp., Santa Monica, Calif.
ARTIFICIAL SATELLITES OF THE MOON,

by Robert W. Buchheim. 14 June 56, 78p. incl. illus. (Rept. no. P-873)
Unclassified report

DESCRIPTORS: (*Lunar probes, *Satellite vehicles, Aerodynamic configurations, Design, Moon, Satellite vehicle trajectories, Velocity, Orbital flight paths, Satellite attitude, Control systems, Exterior ballistics, Flight paths, Space flight, Celestial mechanics.) (Orbital flight paths around Moon, Satellite vehicles, Visibility by Optical tracking.)

Requirements for establishing artificial satellites of the moon are discussed. The orbit parameters of lunar satellites are considered and limits are derived for avoiding the fatal extremes of impact on the moon and recapture by the earth. Lunar satellite parameters are related to the initial conditions at the earth rnd of the transit trajectory to the moon. Sample transit trajectories and moon satellite orbits are presented. Computations of motion are based on an earth-moon model that represents the earth and moon as spheres rotating uniformly about their common center of mass. The magnitudes of effects due to factors neglected in this model are estimated. The problems of attitude stabilization during the earth-moon transit and of velocity adjustment near the moon are considered. Lunar satellite size and mass are related to visual magnitude, and approximate system weight requirements are estimated. (Author)

AD-267 809 Div. 12
(TISTP/JDP) OTS price $5.60

Naval Ordnance Lab., Corona, Calif.
MULTICHANNEL FUZE SYSTEMS FEASIBILITY STUDY.
by C. J. Dupuy and E. A. Williamson. 1 Oct 61, 56p. incl. illus. tables.
(NAVWEPS rept. no. 7179) Unclassified report

DESCRIPTORS: (*Guided missile fuzes, *Proximity fuzes, Design, Trigger circuits, Feasibility studies, Effectiveness, Reliability.) (Targets, Detection, *Guided missiles, Launching, Guided missile trajectories, Mathematical analysis, *Interception probabilities.)

An analysis is made of multichannel fuze systems, with emphasis on parallel channel systems. The effects on kill probability of the total number of channels, the number that must actuate to fire the fuze, and the burst characteristics of each are discussed. The additional effects on fuze reliability of the probabilities of early actuation and dudding of the individual channels are also considered. Measures of reliability and kill probability are combined to yield a figure of merit expressing the degree of attainment of reliable burst control against all intended targets under every anticipated intercept condition. (Author)

AD-267 856 Div. 12
(TISTW/EET) OTS price $1.60

Space Technology Labs., Inc., Los Angeles, Calif.
INERTIAL COMPONENTS STUDY.
Semiannual rept. 1 July-31 Dec 60,
by L. K. Jensen. 31 Dec 60, 14p. 21 refs.
(Rept. no. STL/TN-60-000-19228)
(Contract AF 04(647)619)
(AFBMD TN-61-7) Unclassified report

DESCRIPTORS: (*Guided missiles, Surface to surface, *Inertial guidance, Instrumentation, Accelerometers, Gyroscopes, Servo systems, Measurement, Tests.)

Evaluations of inertial components used in the ballistic missile weapons systems were conducted; testing methodologies and measurement techniques used in the evaluation of precision gyros and accelerometers were studied; and knowledge of the state of the art of inertial components was maintained. Additionally, a critical problem area in the Minuteman development program was investigated and special tests were conducted in connection with the generation of quick fixes for the AMR Minuteman checkout procedures. (Author)

AD-267 878 Div. 12, 25
(TISTA/WAW) OTS price $1.60

Naval Ordnance Lab., White Oak, Md.
DESIGN AND CONSTRUCTION OF ATTITUDE CORRECTING SOLENOIDS FOR THE TRAAC SATELLITE,
by Edward T. Hooper and Richard H. Lundsten.
Oct 61, 18p. incl. illus. tables (Rept. no. NOLTR 61-120)
Unclassified report

DESCRIPTORS: (*Satellite attitude, *Satellite vehicles, *Stabilization systems, Electrical equipment, Magnetic fields, Torque.) (*Solenoids, Design, Mathematical analysis.) (Circuits, Design, Mathematical analysis.)

The design procedure is given which was employed in developing a set of four electromagnetic solenoids to correct the attitude of the TRAAC Satellite with respect to the earth by torque produced with the earth's magnetic field. Fluctuations in power drain and moment produced by the solenoids are given for variations in satellite power supply voltage. Analysis and design are given for the capacitor discharge demagnetizing system required to satisfy the stringent requirement on moment produced by the solenoids when the current is turned off. (Author)

AD-267 950 Div. 12, 25
(TISTA/SEB) OTS price $2.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
THE STUDY OF ELECTROMAGNETIC TECHNIQUES FOR SPACE NAVIGATION.
Quarterly progress rept. no. 7, 16 Aug-15 Nov 61,
by R. G. Franklin. 15 Nov 61, 23p. incl. illus.
(Rept. no. Q-A2415-7)
(Contract AF 33(616)7244, Proj. 0(610-4277))
Unclassified report

DESCRIPTORS: (*Space navigation, *Electromagnetism, Solar energy, Solar noise, Light transmission.) (Solar spectrum, Templates, Spectrographic analysis, Spectrographic data.) (Density sensitive indicators, Interferometers.) (Optical systems, Doppler systems.)

Results of scans using a solar template are presented. The data showed no improvement over an iron arc template. The noise due to atmospheric variations becomes negligible at about 500 cps.

Consequently, the spectrograph was modified to permit variation of the slit above this frequency. No data have yet been obtained with the modified system. Some preliminary interferometer measurements of the Hg-198 lamp was made following the installation of the equipment on a vibration free pillar in the basement of the building. Some delay was caused by ventilation problems associated with the elimination of ozone generated by the lamp. Initial measurements show that the intensity agrees favorably with that reported by Forrester for his lamp. Results of preliminary studies dealing with the design of equipment for the stellar spectroscopy work are presented. (Author)

AD-268 011 Div. 12
(TISTA/SEB) OTS price $1.60

Rocketdyne, Canoga Park, Calif.
OSTF PROGRAM EMA TESTING (APRIL 1961).
Monthly progress rept.
15 May 61, 14p. (Rept. no. R-2831-6)
(Contract AF 04(647)562)
Unclassified report

DESCRIPTORS: (Guided missiles, Surface to surface, *Rocket motors, *Booster rockets, *Hydraulic pressure pumps, Liquid rocket propellants, Maintenance equipment, Ground support equipment, Test facilities, Test methods, Test equipment, Maintenance, Tests.) Instruction manuals.

Testing was directed toward determining the effectiveness of the MA-3 booster engine servicing technical data and the performance of certain special tests. The equipment used for the booster engine tasks was found generally sufficient and adequate. The (reliability improvement demonstration was a goof-proofing study conducted as a direct result of the failure of missile 16E and was designed to locate all areas of possible misconnection within the engine envelope, between the AGE and the engine, and the missile and the engine. An evaluation of changes was made in the engine flush and purge procedure. Other special tests included a checkout of new filters for the G 3067 hydraulic pumping unit, a checkout of the SPGG torque wrench, and an evaluation of the results of certain potentially hazardous AGE misconnections. (Author)

AD-268 020 Div. 12, 9
(TISTA/WAW) OTS price $2.60

Aerospace Corp., El Segundo, Calif.
BUFFETING DATA OBTAINED ON MERCURY/ATLAS MA-2 AND MA-3,
by G. Young and T. Shiokari. 21 Aug 61, 17p. incl. illus. table (Rept. no. TDR-594(1101)TN-1)
(Contract AF 04(647)594)
Unclassified report

DESCRIPTORS: (Guided missiles, Surface to surface, *Satellite vehicles, *Booster rockets, *Airframes, Deformation, Load distribution, Measurement, Flight testing.) (*Aerodynamics, Turbulence, Turbulent flow, Oscillation.)

Two Mercury/Atlas vehicles, MA-2 and MA-3, were instrumented in order to evaluate vehicle structural integrity under flight conditions. The instrumentation system was oriented toward obtaining dynamic rather than static type data since no buffeting data have been obtained on the Mercury configuration. Flight data were obtained through the complete sonic region on MA-2; however, data only up to low transonic region were obtained on MA-3. Structural response data on the adapter and upper LOX tank were obtained. Due to the improper choice of the transducers and ranges, no quantitative data were obtained for adapter vibration and pressure. (Author)

AD-268 021 Div. 12
(TISTA/LSK) OTS price $11.50

Aerospace Corp., El Segundo, Calif.
ABLESTAR ORBIT CASES PROJECT COMPOSITE I.
3 Nov 61, 1v. incl. illus. (Rept. no. TOR-930(2102)-13)
(Contract AF 04(647)930)
Unclassified report

DESCRIPTORS: (Satellite vehicles, *Satellite vehicle trajectories, *Orbital flight paths, Radar tracking, Guided missile tracking systems.) (Flight paths, Mathematical prediction, Tables.)

The orbit cases for the COMPOSITE I Ablestar stage are published to provide information to those agencies concerned with the tracking and orbit determination requirements of the COMPOSITE I mission. The report consists of printouts programmed as a function of time. View angles and times for selected data acquisition stations are shown. A key defining the parameters used in the computation is included in the introduction. The following designations will be used both in the computer printouts on the tabs: Completely nominal powered flight trajectory followed by Ablestar fuel venting after injection. Nominal powered flight trajectory up to the time of SECO I, but with no restart of the second stage engine and no fuel venting. Completely nominal powered flight trajectory, but with no venting of Ablestar fuel after injection. Ablestar engine cutoff at the end of first burn (SECO I) by fuel depletion. Cases 1, 3, and 4 are published in this document. Case 2 is omitted since it is not of use in the COMPOSITE I mission.

AD-268 085 Div. 12
(TISTA/SEB) OTS price $3.60

Space Technology Labs., Inc., Los Angeles, Calif.
CONTROL SYSTEMS STUDIES.
Semiannual rept., 1 July-31 Dec 60,
by Robert E. King. 31 Dec 60, 27p. incl. illus. 20 refs. (Rept. no. STL/TN-60-0000-19227)
(Contract AF 04(647)619)
(AFBMD TN-61-5) Unclassified report

DESCRIPTORS: (*Guided missiles, Surface to surface, *Control systems, *Accelerometers, Electronic circuits, Design, Reliability, Tests.) (Servo systems, Pneumatic servomechanisms, Gases.) (Digital systems, Digital computers, Computers, Analog systems, Analog computers, Scheduling.) (Gyroscopes, Inertial guidance.)

Progress is divided into 4 sections covering the following divisions of effort: (a) Advanced Control System Circuit Development, (Test Vehicle No. 2), (b) Circuit Reliability Studies, (c) Digital Control System Circuit Development, and (d) Hot Gas Servo Studies. On Test Vehicle No. 2, the development, testing and present status of the signal processing and power supply circuitry for use in connection with the MIG gyros is described. Also, the results of en-

vironmental and life testing of the printed circuit timer-programmer and the status of the welded circuit time-programmer are presented. Under circuit reliability studies, some preliminary results of a study of the application of redundancy to both digital and analog circuits and work on circuit failure analysis using component failure rate data is described. The development of digital control system circuitry is described, specifically that circuitry applicable to a digital autopilot system and certain circuitry developed for use with advanced programmers and function generators. The work in the hot gas servo area consisted of the preparation of test plans and the performance of testing on General Electric's hot gas servo. (Author)

AD-268 090 Div. 12
(TISTW/EET) OTS price $8.10

Radio Corp. of America, Camden, N. J.
STUDY OF INSTRUMENTATION AND TECHNIQUES FOR MONITORING VEHICLE AND EQUIPMENT ENVIRONMENTS AT HIGH ALTITUDE. INSTRUMENTATION AND MONITORING TECHNIQUES.
Final rept.
June 60, 79p. incl. illus. tables, 77 refs.
(Contract AF 33(616)6407, Proj. 8223)
(WADC TN 59-307, Vol. 3) Unclassified report

DESCRIPTORS: (High altitude, *Space environmental conditions, Re-entry vehicles, Instrumentation and *Monitors for Satellite vehicles, Effectiveness.) (Space environmental conditions, Instrumentation for Spaceships, Spaceflight, Re-entry vehicles.) (Spaceships, Pilots, Radiation hazards, Dose rate, Monitors, Effectiveness.) (Space environmental conditions, Monitors, Measurement, Aerodynamic heating, Temperature, Pressure, Structures, Stresses, Load distribution, Vibration, Acceleration, Acoustics.) (Meteorites, Detection.)

Instrumentation techniques are presented which are available within the state-of-the-art; an instrumentation system is proposed for the monitoring of high-altitude environments encountered by typical vehicles. The high altitude environmental effects on typical vehicles and equipment are summarized. The present airborne-instrumentation state-of-the-art is presented for measuring temperature, pressure, strain, vibration, acceleration, radiation, meteorite detection, and acoustic noise. A feasible instrumentation system is discussed for monitoring these deleterious environments. (Author)

13. INSTALLATIONS AND CONSTRUCTION

AD-267 468 Div. 13, 14
(TISTE/CDM) OTS price $1.25

Naval Civil Engineering Lab., Port Hueneme, Calif.
THE EFFECTS OF LONG-TIME LOADS ON PRESTRESSED CONCRETE HOLLOW-BOX BEAMS,
by R. A. Breckenridge. 21 Nov 61, 44p. incl. illus. tables (Technical rept. no. 175)
(Proj. Y-R007-05-003)
Unclassified report

DESCRIPTORS: (Reinforced concrete, *Box beams, Stresses, Tests, Aging.)

Tests were conducted on prestressed concrete hollow-box beams under loads of various magnitudes. Prestressed concrete beams suffer from certain time-dependent changes. They lose part of their initial prestress, their deflection increases, and the concrete shrinks and creeps. To obtain information on prestressed concrete hollow-box beams, 8 such beams were loaded for 4-1/2 years and changes in deflections, concrete strains, and prestressing forces were recorded. The beams were 42 ft. long, 33 in. deep, and 18 in. wide. They were simply supported on a 40-ft. span and uniformly loaded with concrete weights. Four different loading conditons were used. The loaded beams had an additional time-dependent deflection during the 28 days following loading approximately equal to the immediate elastic deflection at the time of loading. The beams with no live load continued to deflect upward. Measurements showed that the time-dependent strains in the concrete were greater than the immediate strains due to normal working stresses. The prestressing force data indicates that the unloaded beams experience a greater reduction of prestress than the loaded beams, that the first-year prestressing losses can be as high as 13%, and that in 4-1/2 years they can be as high as 22%. (Author)

14. MATERIALS (NON-METALLIC)

AD-267 111 Div. 14
(TIPTM/TCG) OTS price $1.00

Physics Lab., Wright Air Development Div., Wright-Patterson Air Force Base, Ohio.
EVALUATION OF BUNA-N (NBR) GASKETS IN PROTOTYPE APPLICATIONS UNDER GAMMA FLUX.
Rept. for Sep 57-Jan 59, on The Chemistry and Physics of Materials,
by John A. Parker and Denver Hale. Feb 61, 31p. incl. illus. tables.
(Proj. no. 7360)
(WADD TR 59-661) Unclassified report

DESCRIPTORS: (*Rubber gaskets, *Acrylonitriles, *Butadienes, Rubber, Chemical properties, Quantitative analysis, Seals, Sealing compounds under Gamma rays.) (Radiation effects on Physical properties and Bonding in Polymerization, Ferrocenes, Effectiveness in Reduction, *Radiation damage.) (Laboratory equipment, Measurement, Gas leaks, Gaskets.) Tensile properties, Flanges, Pressure.

Qualitative and quantitative sealability tests were evaluated to test the theoretical prediction of the stability of certain acrylonitrile-butadiene rubber stocks. Reasonable agreement between sealability coefficients was obtained from the seal tester and relative replacement

times over a dose range from 2 x 10 to the 9th power to 2 x 10 to the 10th power ergs/g C (one roentgen = 87.7 ergs). Evaluation criteria for these compositions were established by application of the Bopp-Sisman relationship to observed changes in the elastic modulus previously reported. The effect of ferrocene as a potential anti-rad was investigated and found to improve the radiation resistance of these stocks. The apparatus described for determining sealability of gasket materials consist of a method of applying a load on the gasket, equipment for pressurizing one side of the gasket seal and a method for measuring gas leakage. (Author)

AD-267 118 Div. 14
(TISTM/TCG) OTS price $1.60

Material Lab., New York Naval Shipyard, Brooklyn.
REPORT OF INVESTIGATION ON NONDESTRUCTUVE TESTS FOR FOAMED-IN-PLACE RESINS.
Progress rept. no. 1,
by I. Resnick. 13 Sep 61, 18p. incl. illus. table (Lab. Proj. 6193)
Unclassified report

DESCRIPTORS: (Materials, *Plastics, Polymers, Urethanes, *Resins, Expanded plastics, Foams, Distribution, Deformation, Deterioration, Stresses, Density, *Non-destructuve testing.) (Test methods, Ultrasonic radiation, Dielectric properties, Thermal conductivity, X-ray diffraction analysis, Neutron absorption, Infrared equipment.)

Nondestructive test methods for expanded plastics were studied with the objective of developing a technique for detection of flaws in large sections. Results of an experimental survey using ultrasonic, dielectric, infrared, thermal conductivity, x-ray and neutron absorption techniques are reported. Comments on these and other methods are included. At present, the neutron absorption, thermal conductivity and infrared techniques appear to be more promising than the others. (Author)

AD-267 138 Div. 14, 26, 8
(TISTM/GEC) OTS price $1.60

Cornell-Dubilier Electric Corp., New Bedford, Mass.
PEM FOR PRODUCTION OF FLUORINATED BARIUM TITANATE CAPACITORS FOR OPERATION TO 200 C.
Quarterly rept. no. 1 for period ending 27 July 61,
by L. E. Nordquist. July 61, 12p.
(Contract DA 36-039-sc-85955)
Unclassified report

DESCRIPTORS: (Titanium compounds, Barium compounds, Fluorides, Ceramic materials, Dielectrics, Capacitors, Manufacturing methods, Processing, Thermal insulation, Military requirements.) (*Ceramic capacitors, *Barium compounds, *Titanates, Fluorination, Encapsulation.) Industrial mobilization.

A study was made of the degradation and fluorination of ceramic dielectrics and a sound approach to the problem of manufacture of fluorinated ceramic capacitors to permit maximum use of present production facilities was established. A two fire approach is planned, binder burn off and partial sintering followed by a fluorination-maturing firing. A temporary tunnel kiln was assembled with a pusher mechanism to provide accurate soaking periods from 30 min to 2 hours. The fluoride atmosphere will be provided by introduction of volatile fluorides on a regular schedule. Efforts will be made to establish the capability to fluorinate 16,000 capacitor disc per 8-hr shift and to manufacture 4000 capacitors each of four types in accordance with Signal Corps Technical Requirements SCS-37 dated 9 March, 1959 and amendment No. 1 dated 29 November, 1960. (Author)

AD-267 203 Div. 14, 4
(TISTM/TCG) OTS price $1.60

Aerojet-General Corp., Azusa, Calif.
RESEARCH AND DEVELOPMENT OF HIGH-TEMPERATURE-STABLE INORGANIC RESINS AND ELASTOMERS.
Quarterly rept. for 1 July-30 Sep 61,
by J. Feltzin. 26 Oct 61, 14p. incl. tables.
(Rept. no. 0423-01-1)
(Contract DA 04-495-ORD-3075)
Unclassified report

DESCRIPTORS: (*Resins, *Elastomers, Polymers, *Heat resistant polymers, High temperature research, Stability, Synthesis, Polymerization, Copolymerization, Catalysis.) (Chemical reactions, Asbestos fibers or Mica or Methyl radicals and Chlorides of Silanes with Quinolines, Hydrochloric acid. (Sodium compounds, Hydroxides or *Silicates, Potassium compounds, Cyanides, *Silicon compounds, Inorganic substances, Chelate compounds, Phenyl radicals.) (Molecular structure, Crystal structure, Solubility, Viscosity.)

Three methods for extraction of metal ions from the matrix of asbestos and mica were investigated. These were treatment with the chelating agent, 8-hydroxyquinoline, leaching with concentrated HCl, and leaching with 10% aqueous NaOH. Some success was achieved with asbestos treatments. Attempts to increase the molecular weights of the polymer derived from the reaction of an organohalosilane and Na silicates were only partially successful. Methods involving time and temperature effects; the use of a crosslinking agent, methyltrichlorosilane; and refluxing with catalytic quantities of KOH were only moderately successful. Polymers containing phenyl groups having characteristics similar to those obtained from dimethyldichlorosilane and Na_2SiO_3 have not yet been prepared. (Author)

AD-267 246 Div. 14, 4
(TISTM/TCG) OTS price $.50

Rock Island Arsenal Lab., Ill.
BORON POLYMERS, A LITERATURE SURVEY,
by L. G. Wiedenmann. 12 Sep 61, 15p. 35 refs.
(Rept. no. 61-3350)
(Proj. 548-03-003) Unclassified report

DESCRIPTORS: (*Bibliography, *Boron compounds, Organoboranes, Decaboranes, Diboranes, Pentaboranes, *Polymers, *Elastomers, Synthesis, Chemical reactions, Hydrolysis, Temperature, Decomposition, Catalysis, Polymerization, Catalysts.) (Alkyl radicals, Borates, Esters, Hydroxides, Boric acids, Borides, Borines, Borohydrides.) (Shielding, Materials.)

A survey of available literature through 1960 was made in search for boron polymers containing only carbon, hydrogen and oxygen. Recommendations were made for a baron elastomer research program.

AD-267 247 Div. 14, 25
(TISTM/TCG) OTS price $3.60

Utah U., Salt Lake City.
SURFACE AND ENVIRONMENTAL EFFECTS ON CERAMIC MATERIALS.
Rept. for June 60-May 61, on Ceramic and Cermet Materials,
by P. Gibbs, G. S. Baker and others. July 61, 27p. incl. illus. tables, 29 refs.
(Contract AF 33(616)6832, Proj. 7350)
(ASD TR 61-182) Unclassified report

DESCRIPTORS: (*Ceramic materials, Crystals with *Aluminum compounds, Oxides, Effectiveness of *Surface properties, Stresses on Failure (Mechanics), Creep, Plasticity, Plastic flow, Temperature, Energy, Tests, Thermodynamics, Diffusion.) (Single crystals, Deformation, Flames, Finishes.) (Silver compounds, Films on Corundum, Voltage, Conductivity.)

Polycrystalline sintered compacts of doped Alucer MC Al2O3 were deformed in 3 point beam loading from 1000 to 1350 C. The steady state creep rate of specimens doped with MgO or Mn(CO3)2 from 50 to 5000 ppm by weight were fit to the expression A exp (-E/kT). The activation energy E was 130 kcal/mol independent of added impurity. The constant A was independent of Mn(CO3)2, but decreased by a factor of 3-5 on the addition of MgO. Polycrystalline creep apparently is controlled by diffusion of vacancies in the steady state. Creep behavior of Linde corundum 0.1-in.-diam rods (1000-1250 C) is described. At the lowest temperatures and stresses studied, measureable creep (0.1 micron/hr beam deflection) began after about an hour's time delay, and increased at an accelerating rate. One run was successfully continued to reach a steady state (7500 micron deflection). Activation energies increased as creep proceeded (71-135 kcal/mol). (Author)

AD-267 360 Div. 14, 17, 30, 12
(TISTM/GEC) OTS price $1.60

Directorate of Materials and Processes, Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
ELEVATED TEMPERATURE BEHAVIOR OF FIBERS.
Rept. for July-Oct 60, on Fibrous Materials for Decelerators and Structures,
by Stanley Schulman. Aug 61, 12p. incl. illus.
(Proj. no. 73201)
(WADD TN 60-298) Unclassified report

DESCRIPTORS: (Deceleration, Airframes, Satellite vehicles, Spaceships, *Refractory materials, *Fibers, *Glass textiles, *Synthetic fibers, Nylon, *Metallic textiles of *Heat resistant alloys, Tungsten, Molybdenum, High temperature research.) (Tests, Test methods, Test equipment, Heat treatment, Physical properties, Tensile properties, Elasticity, Stresses.)

A study was conducted to determine the mechanical behavior of fibers at high temperatures for varied periods of time. These fibers are candidate materials for decelerators, and expandable and rigid structures for satellites or space vehicles. Besides condition of extremes of temperature, these fibers will have to be capable of operation under shock, vibration, solar and cosmic radiation and related aerospace environments. These high temperature fibers were evaluated in filament form at temperatures ranging from 70 F (65% relative humidity) to 2000 F. Since fibers normally were of diameters as low as 0.0003 in., special equipment and procedures were designed to obtain their basic properties. (Author)

AD-267 538 Div. 14
(TISTA/SEB) OTS price $2.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
INORGANIC PASSIVE THERMAL SURFACES.
Technical rept.,
by J. Tsukamoto. Oct 61, 20p. incl. illus. tables (Rept. no. 3-71-61-15)
(Contract AF 04(647)564)
Unclassified report

DESCRIPTORS: (*Aircraft finishes, Satellite vehicles, *Coatings, *Refractory materials, *Heat resistant paints, Design, Preparation, Temperature control, Thermal radiation, Space environmental conditions, Ultraviolet radiation, Solar energy, Absorption, Radiation effects, Stability, Adhesion, Optics, Tests.) (Silicates of Aluminum compounds, Magnesium compounds, Alkali metal compounds, Sodium compounds, Potassium compounds, Lithium compounds.)

The development of low solar absorptivity inorganic passive thermal control surfaces for space technology is described. The composite coating which functions as an optical surface must have low and stable absorptance-to-emittance ratios as well as chemical and physical stability during prolonged exposure to space environment. The alkali silicate-refractory silicate formulations developed meet many of these requirements. Procedures and formulations used in the development of these coatings are described. (Author)

AD-267 541 Div. 14, 17, 12
(TISTM/EJH) OTS price $23.50

Southwest Research Inst., San Antonio, Tex.
PROPERTIES OF INORGANIC ENERGY-CONVERSION AND HEAT-TRANSFER FLUIDS FOR SPACE APPLICATIONS.
Rept. for Mar 60-Nov 61 on Materials Application,
by W. D. Weatherford, Jr., John C. Tyler, and P. M. Ku. Nov 61, 477p. incl. illus. tables, 167 refs.
(Contract AF 33(616)7206, Proj. 7381)
(WADD TR 61-96) Unclassified report

DESCRIPTORS: (*Coolants, *Fluids, *Liquid metals, Inorganic substances, *Gases, Heat transfer, Transport properties, Thermal conductivity, Thermodynamics, Physical properties, Electrical properties, Resistance, Magnetic properties, Corrosion, Neutron cross sections.) (Aluminum compounds, Bromides, Sulfur, Lithium compounds, Hydrides.) (Spaceships, Satellite vehicles, Propulsion, Power supplies.) Liquid metals, Mercury, Cesium, Rubidium, Potassium, Sodium, Sodium compounds, Potassium compounds, Lithium, Bismuth, Lead.) (Argon, Helium, Hydrogen.) (*Handbooks, *Tables.)

This report is a complete revision of WADC TR 59-598 (AD-230 065) and is intended to serve as a properties handbook for various inorganic fluids which may have potential value as energy-conversion or heat-transfer fluids for space applications. The fluids are presented as 3 distinct classes - namely, liquid metals, nonmetals, and gases. The liquid metals include Hg, Cs, Rb, K, NaK, Na, Li, Bi, and Pb. The nonmetals include $AlBr_3$, S, and LiH. The gases include Ar, He, and H. Data are presented, where available, up to temperatures ranging from 2300 F for mercury to 4500 F for lead, and for pressures ranging from less than one atmosphere to greater than twenty atmospheres. The characteristics of the various fluids are discussed, and the recommended values for the fluid properties are presented in either tabular or graphical form, or both, with documentation. (Author)

AD-267 600 Div. 14, 12
(TISTM/EJH) OTS price $4.60

Douglas Aircraft Co., Inc., Santa Monica, Calif.
GAM-87A RAIN EROSION PROTECTION COATINGS FOR SUBSONIC SPEEDS.
Test rept.,
by H. S. Smith and E. R. Hill. 1 Mar 61, 42p. incl. illus. (Rept. no. SM-38529)
(Contract AF 33(600)39587)
Unclassified report

DESCRIPTORS: (Plastics, Resins, Phenolic resins, Nylon, *Laminates, Erosion by Raindrops, *Weatherproofing, *Coatings, *Plastic coatings, Paints, Elastomers, Pigments.) (Guided missiles, Air to surface, Re-entry vehicles, Control surfaces, Materials, Heat resistant polymers, Thermal insulation.) (Test equipment, Test methods, Tests.)

High velocity contact with raindrops causes a severe erosion problem on phenolic materials. The following test was run to determine the most suitable coating for protection of the thermal insulation material on the GAM-87A re-entry vehicle from rain erosion. Specimens made from Phenolic Refrasil and Phenolic Nylon, both coated and uncoated, weathered and unweathered, were tested at a velocity of 500 mph on two rotating, electrically driven propeller blades through a simulated rainstorm of 1 in./hr intensity and with drops of 2 mm average diameter. (Author)

AD-267 638 Div. 14
(TISTM/REB) OTS price $1.60

Fuels Research Lab., Mass. Inst. of Tech., Cambridge.
TEMPERATURE MEASUREMENTS IN PLASTICS EXPOSED TO THERMAL RADIATION FROM NUCLEAR EXPLOSIONS (APPENDIX E),
by C. C. Williams, III. 15 Apr 53, 16p. incl. illus. tables (Technical rept. no. 2, Appendix E)
(Contract N5ori-07851)
(AFSWP-204A) Unclassified report

DESCRIPTORS: (*Plastics, Thermal radiation, Nuclear explosions, Temperature, Measurement.) (Polymers, Esters.) (Thermocouples, Platinum alloys, Rhodium alloys.) (Gold alloys, Palladium alloys, Rhodium alloys.) Surface temperatures.

In an attempt to extend the transient heat flow analysis applied in the laboratory to actual field conditions, several samples of the polyester plastic containing fine wire thermocouples were exposed to thermal radiation from nuclear explosions. These experiments were carried out at the Nevada Proving Ground of the Atomic Energy Commission during the Spring, 1952 series of field tests (OPERATION TUMBLER). The sample blocks were mounted in metal boxes which were then located 10 ft above the ground at a distance of 1500 ft from the expected Ground Zero. In this location, the irradiated surface of the plastic was in a vertical plane and thus at an angle (which varied with burst height from 36 to 68 degrees from the normal) to the radiation from the fireball. (Author)

AD-267 702 Div. 14, 17, 26
(TISTM/TCG) OTS price $21.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE ACTION OF LUBRICANTS IN PRESSURE WORKING OF METALS (Deystviye Smazok Pri Obrabotke Metallov Daveleniyem),
by S. Ya. Veyler and V. I. Likhtman. 16 Nov 61, 362p. incl. illus. tables, 375 refs. (Trans. no. MCL-1389 of Izdatel'stvo Akademii Nauk SSSR Moskva, pp. 1-231, 1960)
Unclassified report

DESCRIPTORS: (*Lubricants, Lubricating additives, Lubrication for *Extrusion, Forging, *Drawing (Machine processing), Pressure, Processing, Production, Manufacturing methods of *Metals, Alloys, Wire, Metallic compounds.) (Additives, Organic compounds, Glass, Salts, Eutectics.) (Friction, Surface properties, Deformation, Plasticity, Viscosity, Adsorption, Tensile properties, Mechanical properties, Tests.) (USSR, Translations, Technological intelligence.) Metal forming presses.

The book presents data on specific lubricating compounds for use in the pressworking of metals; these compounds are of great interest for the metalworking and machine-building industries. The book embodies an extensive section devoted to the physicochemical properties of the lubricating effect and new concepts of the mechanism by which lubricants operate. These new conceptions enabled the authors to describe quantitatively the processes of wire-drawing, deep-drawing, and extrusion of metals, and to work out a physicochemical basis for rational selection of lubricants for a number of metal-pressworking processes. (Author)

AD-267 757 Div. 14, 15
(TISTA/SEB) OTS price $2.60

Space Technology Labs., Inc., Los Angeles, Calif.
COMPARISON OF APPROXIMATE SOLUTIONS OF THE THERMOELASTIC PROBLEM OF THE THICK-WALLED TUBE,
by J. H. Baltrukonis. 6 Mar 58, 23p. incl. illus. tables (Rept. no. EM 8-3; Rept. no. GM-TR-0165-00333)
(Contract AF 04(647)165)
Unclassified report

DESCRIPTORS: (*Cylindrical bodies, Stresses, *Thermal stresses, Elasticity, High temperature research, Mathematical analysis, Mathematical prediction, Computers, Algebraic geometry, Partial differential equations, Potential theory.)

The stress distribution in a thick-walled, circular cylindrical tube subjected to a steady-state temperature gradient across the tube wall is calculated, taking into account the variation with temperature of the elastic and thermal properties of the material. The calculations are made by 5 methods: (1) by electronic digital computer; (2) by assuming an incompressible material; (3) by assuming a temperature-independent material and using the average properties of the material; (4) by using the weighted-average properties of the material; and (5) by using a higher order approximation. Good agreement is found when high temperature levels do not persist over large portions of the tube. When the latter is the case, only Method 5 gives better than a qualitative picture of the stress distribution. (Author)

AD-267 769 Div. 14
(TISTM/TCG) OTS price $11.00

Naugatuck Chemical Div., United States Rubber Co., Conn.
DEVELOPMENT OF SELF-LUBRICATING AND NON-ADHERING

ELASTOMERIC MATERIALS.
Quarterly rept. no. 4 and Final summary rept., 1 Mar-15 July 61,
by W. E. Galwardy and A. S. Krivitsky.
31 July 61, 138p. incl. illus. tables.
(Contract NOw 60-0123-c)
Unclassified report

DESCRIPTORS: (*Elastomers, Rubber, Polymers, Friction, Adhesion, Physical properties, Tensile properties, Measurement, Tests, Mechanical properties.) (*Synthetic rubber, Nitrile rubber, Butyl rubber.) (Additives, Graphite, Butadienes, Styrenes.) (Ethylenes, Propenes, Sulfides, Acrylonitriles, Fluorides, Urethanes, Silicones.) (Coatings, *Lubricants, *Anti-seize compounds.)

In the development of self-lubricating and non-adhering elastomeric materials, simple test apparatus and procedures were developed which measured quantitatively the starting coefficient of friction. The lowest starting coefficient of friction values were obtained by modifying a nitrile rubber elastomeric base compound with a fluorocarbon fabric laminate or fluorocarbon chemical treatment of the surface. Polysulfide fluorocarbon and silicone rubbers had low SCf values which did not approach those obtained with fluorocarbon films on elastomeric bases. Experiments were designed to investigate the mechanism seizure of rubber compounds with metal parts during sustained periods of idleness. Apparently the so-called seizure phenomena is induced by increased humidity and temperature conditions. (Author)

AD-267 771 Div. 14
(TISTM/TCG) OTS price $1.10

Vermont U., Burlington.
A SIMPLE EXPERIMENT TO SHOW THE ORIGIN OF WATER INFLUENCING THE DEBONDING OF RESIN AGAINST GLASS,
by John O. Outwater and David H. Kellogg.
15 Sep 61, 6p.
(Contract Nonr-321901)
Unclassified report

DESCRIPTORS: (Deterioration, *Bonding, *Resins, Glass by Water, Diffusion, Heating.)

Resin adhered to glass was boiled in water both when a surface was fully exposed and when a surface was covered by glass except for an edge. In both cases the resin debonded after the same time of boiling. This indicated that the debonding was due primarily to the encroachment of water from the exposed edge and that the effect of diffusion of water through the resin was of secondary importance. (Author)

AD-267 792 Div. 14, 1, 17
(TISTM/GEC) OTS price $1.75

Fabric Research Labs., Inc., Dedham, Mass.
SOME EFFECTS OF COMPRESSION AND HEAT ON DECELERATOR MATERIALS.
Rept. for Aug 59-Feb 61 on Fibrous Materials for Decelerators and Structures,
by Norman J. Abbott. June 61, 56p. incl. illus. tables.
(Contract AF 33(616)6738, Proj. 7320)
(WADD TR 60-588) Unclassified report

DESCRIPTORS: (*Textiles, *Parachutes, Deceleration, *Parachute fabrics, Nylon, Dacron, Organic materials, Fibers, Glass textiles, Metallic textiles, Stainless steel.) (Tests, Test methods, Deterioration, High temppperature research, Pressure, Tensile properties, Shear stresses, Deformation, Rupture, Controlled atmospheres.)

The degradation of nylon parachute materials and similar materials made from dacron, glass, an organic fiber, and stainless steel was studied at temperatures up to 1000 F, pressures up to 250 psi and times up to 72 hr. The amount of degradation for most of the materials was found to be consistent with that reported by other authors who did not study the influence of pressure. Pressure decreased degradation somewhat because of the reduction in the amount of oxgen contained within the structure. The increased resistance to degradation of Type 700 nylon was apparent in the results. The improved resistance to degradation of dacron as compared to nylon is well known. Glass fabrics retained most of their strength up to 500 F, and the organic fiber up to 600 F (although at 650 F it was badly degraded). Stainless steel showed little change after being exposed to 1000 F for 72 hr. (Author)

AD-267 823 Div. 14, 1, 25
(TISTM/GEC) OTS price $1.10

Princeton U., N. J.
A SHORT DISCUSSION OF THE FEASIBILITY OF THE USE OF RADIOACTIVE AND OTHER COATINGS IN ELIMINATING AIRCRAFT ELECTRICAL CHARGE,
by Enoch J. Durbin and Geradus J. Born. Sep 61, 4p. (Rept. no. 570)
(Contract DA 44-177-tc-524, Proj. 9-38-01-000 and TK902)
Unclassified report

DESCRIPTORS: (*Coatings, Labeled substances, *Aircraft finishes, Beta particles, Energy, Ionization, Resistance.) Electric fields, Electric discharges, Electrostatics, Electrical corona.

An investigation is being made of different types of active discharging methods for aircraft with special attention given to the ac corona systems and combined ac-dc corona systems. A short discussion shows the necessary source strength of radioactive coatings and the dangers involved. Another discussion is presented on coatings which indicate the practical solution involving the use of passive coatings is not readily discernible.

AD-267 824 Div. 14, 25
(TIPTM/GEC) OTS price $1.10

Frick Chemical Lab., Princeton U., N. J.
VISCOELASTIC PROPERTIES OF PLASTICIZED POLYMERS,

by A. V. Tobolsky, D. Carlson, and N. Indictor. 4 Dec 61, 3p. illus. tables (Technical rept. no. RLT-40)
(Contract Nonr-185807, Proj. NR 356-377)
Unclassified report

DESCRIPTORS: (*Polymers, *Plastics, Styrenes, Acrylic resins, Vinyl chlorides, Viscosity, Elasticity, Tests, *Mechanical properties, Creep, Stresses, Temperature, Relaxation time.) Plasticizers, Phthalates.

A study was made to determine why certain polymers are more often used in plasticized form than others. Polystyrene, polymethylmethacrylate and polyvinyl chloride, whose T sub g values are listed as 100, 105 and 75 C respectively were studied. These polymers were plasticized with dioctyl phthalate using 100 parts by weight of polymer and 20 parts by weight of dioctyl phthalate in all cases. Using a combination of torsional creep for the high modulus data, and stress relaxation in tension for lower modulus data, stress relaxation master curves were obtained. (Author)

AD-267 826 Div. 14, 17, 1
(TISTM/TCG) OTS price $4.60

Dow Metal Products Co., Midland, Mich.
PROTECTIVE COATINGS ON MAGNESIUM ALLOYS INTENDED FOR USE ON COMPONENTS OF AIRBORNE VEHICLES.
Final rept. (detailed), 1 June 60-5 Sep 61.
5 Sep 61, 19p. 10 tables, 18 figs.
(Contract DA 20-018-ORD-19650)
Unclassified report

DESCRIPTORS: (Aircraft, *Magnesium alloys, Coatings, *Corrosion inhibition, Corrosion, Metalorganic compounds.) (Polymers, Vinyl radicals, Butyrates, Butyl radicals, Tin compounds, Oxides, Additives to Paint primers, Paints, Conductivity, Controlled atmospheres, Salts, Tests.) (Metal coatings, Plating, Cadmium, Phosphates, Stannates on Steel.)

Tin compound additions to polyvinyl butyral type clear primers provided very effective corrosion inhibition when applied to Mg-steel galvanic couples. A combination of tributyltin oxide and finely divided metallic Sn dust added to the clear primer offered the best protection by increasing the corrosion resistance 90% over non-inhibited primers. Salt spray tests showed the advantages of Sn electroplated fasteners over Cd plate when used in conjunction with Dow #17 Anodizing and various paint systems. The stannate coating was superior to Dow #17 and Cd or phosphate coated steel fastener systems. After prolonged periods of exposure at -40 degrees, electroplated Sn on steel showed a slight transformation from beta to alpha tin. After 650 hr exposure, the corrosion characteristics of Mg alloy painted and unpainted panels (with and without steel fasteners comparing Dow #17 anodizing and the stannate coating) were very encouraging. The conductivity of the stannate coating was 8.0 microhms/sq in. as compared to 7.0 microhms for bare Mg and a high of 74,000 microhms for Dow #17 thin anodize. (Author)

AD-267 890 Div. 14, 20, 21
(TISTM/GEC) OTS price $21.00

Radiation Effects Information Center, Columbus, Ohio.
THE EFFECT OF NUCLEAR RADIATION ON ELASTOMERIC AND PLASTIC COMPONENTS AND MATERIALS,
by R. W. King, N. J. Broadway and S. Palinchak.
1 Sep 61, 370p. incl. illus. tables, 205 refs.
(REIC rept. no. 21; Supersedes rept. nos. 3, AD-149 551; 3A, AD-210 759; 3-2A, AD-239 264; 9, AD-229 487; 13, AD-241 430 and memo. nos. 1, AD-207 043; 3, 8, 15, AD-225 504 and 17, AD-219 511)
(Contract AF 33(616)7375, Proj. 1448)
Unclassified report

DESCRIPTORS: (*Radiation effects, *Radiation damage, Organic materials, *Plastics, *Elastomers, *Polymers, Laminates, Nuclear propulsion.) (Seals, Gaskets, Hoses, Coatings, Electric insulation, Optical materials, Optical plastics, Structural shells.) (Theory, Tests, Controlled atmosphere, Mechanical properties, Physical properties, High temperature research.) *Bibliography.

Organic materials are susceptible to damage from all types of nuclear radiation. Consequently, plastics and particularly elastomers, present serious problems in connection with the development of components and systems for nuclear-powered vehicles. In addition to being susceptible to damage by radiation, many of these rubber and plastic materials are adversely affected by environmental conditions, such as extreme temperatures (-100 to +500 F), vacuum, oxidizing atmospheres (ozone), and various types of fuels, lubricants, and hydraulic fluids. Although there are a number of organic materials which have radiation resistance in the range required, they are not useful in the construction of many components and systems because they are lacking in some other needed property. For example, polystyrene has very good radiation resistance but low strength and heat resistance. Therefore, the major problem is to develop materials which will resist radiation and which are also satisfactory in the environments mentioned above. (Author)

AD-267 905 Div. 14, 4
(TISTM/GEC) OTS price $3.60

Borden Co., Philadelphia, Pa.
STUDY LEADING TO THE DEVELOPMENT OF REINFORCED HIGH TEMPERATURE ELASTOMERS.
Quarterly progress rept. no. 1, 1 July 60-30 Sep 61,
by K. C. Tsou and B. D. Halpern. 30 Sep 61, 30p. incl. illus. table, 63 refs.
(Contract DA 36-034-ORD-3523)
Unclassified report

DESCRIPTORS: (Fluorides, *Elastomers, *Heat resistant polymers, Synthetic rubber, *Silicone resins, Silicones, *Vulcanizates, High temperature research, Stability, Mechanical properties, Tensile properties, Viscosity.) (Silicon compounds, Methyl radicals, Adsorption, Acrylic resins, Polymerization, Copolymerization, Grignard reactions, Substitution reactions.) *Reinforcing materials.

This report includes:
OLEFIN-SUBSTITUTED SILICAS AS ACTIVE FILLERS FOR POLYMERS, by L. E. Neimark, A. A. Chuyko and L. B. Slimiakova, tr. by S. Makower. (Trans. from Visokomolekuliarniye soedinienia, no. 5, p. 711, 1961)

POLYORGANOSILOXANE RESINS WITH GOOD THERMAL AND MECHANICAL STABILITY, by K. A. Andrianov and A. L. Glukhova, tr. by S. Makower. (Trans. of Khimicheskaya Promislennust, no. 6, pp. 347-48, 1957)

An investigation was made of a silicone rubber and fluoroelastomers to study the mechanism of

elastomer reinforcement at high temperature and the factors involved in such filler-elastomer interaction; the development of new filler material which provides good reinforcement to elastomers over a broad temperature range; and the chemical modification of available fillers in order to maximuze their effectiveness at high temperatures. (Author)

AD-267 921 Div. 14
(TISTM/TCG) OTS price $1.10

Science and Tech. Branch, Aerospace Information Div., Washington, D. C.
FOAM COKES.
7 Nov 61, 3p. incl. table (AID rept. 61-149; Trans. of Production of Heat-Resistant Polymer Materials by Pyrolysis Methods. Foam Cokes; Plasticheskiye Massy, No. 9:26-29, 1961)
Unclassified report

DESCRIPTORS: (*Heat resistant polymers, *Expanded plastics, Production by Pyrolysis, *Charcoal, Carbon black, Graphite, Volume, Electrical properties, Tensile properties, Dielectric properties, Stability, Decomposition, Deterioration.) USSR, Translations.

New heat-resistant foamed materials have been produced by the coking of foamed plastics. In the manufacturing process, initial specimens of foamed plastic are placed in a special mixture, heated to a temperature above the pyrolysis temperature, and cooled to room temperature. Most of the foamed plastics studied exhibited a weight loss of 35 to 66% during the coking process. The volume weights of foam cokes surpassed those of the initial foamed plastics by 7 to 10%. The chemical structure of the polymers used affected both the behavior of the foamed plastics during the pyrolysis process and the properties of foam cokes. Foam cokes exhibit higher heat resistance, rigidity, and compressive strength at room and high temperatures than foamed plastics. The dielectric properties of foamed cokes differ considerably from those of foamed plastics and approach those of conducting materials. In general, carbon blacks, cokes, and graphites increase the yield of foamed coke and secure maximum stability of linear dimensions, but reduce compressive strength at high temperatures. (Author)

AD-268 041 Div. 14, 13, 31, 30
(TISTM/EJH) OTS price $4.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
THERMAL DEGRADATION OF POLYMERIC MATERIALS. I. GAS EVOLUTIONS FROM POLYSULFIDE POLYMERS.
Technical rept. on FBM Toxicity Study Program, by M. Honma and E. H. Kawasaki. Dec 60, 40p. incl. illus. tables, 17 refs. (Rept. no. LMSD-800324)
(Contract NOrd-17017)
Unclassified report

DESCRIPTORS: (*Plastics, *Polymers, *Sulfides, Rubber, Pyrolysis, Combustion, Decomposition, Gases, Vapors, Poisonous gases, Aerosols, Chemical analysis, Chromatographic analysis, Toxicity.) (Submarines, Nuclear propulsion, Controlled atmospheres, Contamination, Ventilation.) (Test equipment, Laboratory equipment, Vacuum apparatus, Test methods.)

The use of considerable amounts of polysulfide polymers as coatings and sealants necessitates a study of their thermal degradation behavior under conditions of normal usage and also under abnormal situations in which the polymers are exposed to temperatures beyond their thermal stability. Qualitative identifications of gaseous species resulting from the pyrolyses of several polysulfide polymers (PR 1201, PR 1821, Composite EPON 828 + LP 33, and LP 33) in vacuum and oxygenated atmospheres are discussed. Rate data supplemented by graphs are presented for gaseous species arising during the thermal degradations of PR 1201, PR 1821, and the epoxy polysulfide. These values were obtained from pyrolyses carried out in a dynamic air stream. (Author)

AD-268 076 Div. 14
(TISTM/EJH) OTS price $4.60

Carborundum Co., Niagara Falls, N. Y.
DEVELOPMENT OF ULTRA REFRACTORY MATERIALS.
Summary rept., 1 Nov 60-31 Oct 61, by Peter T. B. Shaffer and Richard L. Watts. 30 Nov 61, 40p. incl. illus. tables.
(Contract NOrd-17175)
Unclassified report

DESCRIPTORS: (*Refractory materials, *Carbides, *Zirconium compounds, *Tantalum compounds, Phase studies, Hardness, Resistance, Elasticity, Melting, Transistor temperatures, Phase transitions, Photoemission.) (*Radomes, Materials, Ceramic materials, Lithium compounds, Aluminum compounds, Silicates, Mechanical properties, Thermal stresses, Stability.)

Room temperature investigations of various physical, mechanical and electrical properties of solid solutions of TaC and ZrC showed no evidence of discontinuous changes indicating new phases or compound formation after a wide variety of annealing treatments. Emissivity studies, however, indicate the probable existence of high temperature phases of both TaC and ZrC, though not of the solid solutions. The reported increase in melting temperature of ZrC-TaC solid solutions was confirmed. Preliminary studies indicate that Lithafrax low expansion lithium aluminum silicate has a thermal shock resistance factor more than twice as great as Pyroceram 9606 and more than four times as great as alumina. Electrical properties, with the possible exception of dissipation factors, are within acceptable limits. Similar lithium aluminum silicate compositions with effectively zero expansion are known. These would, therefore, have infinite thermal shock resistance factors. (Author)

AD-268 089 Div. 14
(TISTM/REB) OTS price $1.00

Emerson and Cuming, Inc., Canton, Mass.
THE DEVELOPMENT OF SILICA HOLLOW MICROSPHERES FOR USE AS A HIGH TEMPERATURE DIELECTRIC.
Rept. for June-Dec 60 on Applied Research in Electrical, Electronic, and Magnetic Materials, by J. W. Lefforge and R. S. Lothrop. July 61, 27p. incl. illus. tables.
(Contract AF 33(616)7263, Proj. 7371)
(WADD TR 60-899, pt. 2)
Unclassified report

DESCRIPTORS: (*Dielectrics, Spheres, *Silicon compounds, *Dioxides, Dielectric properties, Preparation.) High temperature research, Materials.

Silica microbubble material was produced by 2 routes. The direct process melts particles of

silica and expands them into bubbles at 1700 C. Yields of only 5%, primarily because of loss as slag, excessive fuel requirements, and the relatively high true density, 0.8 g/cc, of the produce, made the other process more desirable. Acid-leaching of the 16% sodium glass bubbles, which are made commercially at 950 C, followed by dehydration at 1140 C, gave a product having a true density of 0.26 g/cc. It had a slightly lower dielectric constant, 1.11 to 1.2, and equivalent loss tangent values, less than 0.001, at all frequencies and temperatures below 400 C. Both materials were bonded into sheet structures using cold set cement type bonds without serious degradation of the dielectric properties. These structures withstand moderate loads at 1100 C and do not collapse at 1300 C. Densities range from 0.6 to 1.2 g/cc. (Author)

15. MATHEMATICS

AD-267 115 Div. 15
(TISTP/MFA) OTS price $1.60

Parke Mathematical Labs., Inc., Carlisle, Mass.
A STUDY OF THE SUM AND THE PRODUCT OF TWO CODES,
by L. Calabi and R. Darst. Aug 61, 13p. 6 refs.
(Scientific rept. no. 3)
(Contract AF 19(604)7493)
(AFCRL-723) Unclassified report

DESCRIPTORS: (*Coding, *Communications theory, Errors, Vector analysis, Operators (Mathematics).)

Five parameters describing the error-correcting capability of a group code are determined for the sum A + B and for the product AB of two codes, A, B, in terms of the corresponding parameters for A and B. (Author)

AD-267 164 Div. 15
(TISTP/MFA) OTS price $1.60

Applied Mathematics and Statistics Lab., Stanford U., Calif.
NUMERICAL SOLUTION OF A CERTAIN TRANSCENDENTAL EQUATION INVOLVING EXPONENTIALS (A REMARK ON A PAPER OF J. R. RICE),
by Hans J. Maehly. 13 Sep 61, 11p. incl. table.
(Technical rept. no. 14)
(Contract Nonr-22537, Proj. NR 044-211)
Unclassified report

DESCRIPTORS: (*Numerical analysis, Equations, Algebra, *Transformations (Mathematics), Polynomials.) (Computers, Tables.)

If good starting values (initial guesses) for the root of an algebraic or transcendental equation are known, Newton iteration will yield fast (quadratic) convergence; otherwise, the procedure may fail. For a particular equation, it is shown how convergence can be greatly improved by a simple transformation. Results of numerical values are tabulated. (Author)

AD-267 165 Div. 15
(TISTP/MFA) OTS price $3.60

Applied Mathematics and Statistics Lab., Stanford U., Calif.
BUNDLES OF MATRICES AND THE LINEAR INDEPENDENCE OF THEIR MINORS,
by Beresford Parlett. 7 Sep 61, 34p. (Technical rept. no. 13)
(Contract Nonr-22537, Proj. NR 044-211)
Unclassified report

DESCRIPTORS: (*Matrix algebra, Transformations (Mathematics), Polynomials, Combinatorial analysis, *Linear systems.)

The task of putting systems of first order linear ordinary differential equations into a convenient form for analysis and solution can be presented as the problem of finding a canonical pencil strictly equivalent to a given pencil. Since canonical forms under equivalence are well-known it is useful to see the relation between equivalence and strict equivalence. (Author)

AD-267 209 Div. 15
(TISTP/MFA) OTS price $1.10

Ballistic Research Labs., Aberdeen Proving Ground, Md.
APPLICATION OF A MARKOV CHAIN TO A GENERALIZATION OF AN ALGEBRAIC IDENTITY,
by C. Masaitis. Sep 61, 10p. (BRL Rept. no. 1147)
(DA Proj. 503-06-002)
Unclassified report

DESCRIPTORS: (*Algebra, Theory, *Statistical processes, Probability.)

An identity is generalized to an arbitrary number of variables. The proof of the generalized identity is obtained by computing transition probabilities in a Markov Chain. (Author)

AD-267 210 Div. 15
(TISTP/MFA) OTS price $5.60

Boeing Scientific Research Labs., Seattle, Wash.
TABLES OF LEBEDEV, MEHLER, AND GENERALIZED MEHLER TRANSFORMS,
by Fritz Oberhettinger and T. P. Higgins.
Oct 61, 48p. (Mathematical note no. 246; Document no. D1-82-0136)
(In cooperation with Oregon State U.)
Unclassified report

DESCRIPTORS: (*Integral transforms, Transformations (Mathematics), Bessel functions, *Special functions, *Tables.)

Inversion formulas with kernels containing Bessel functions of purely imaginary order and Legendre functions of complex index with the real part-1/2 (conical functions) as variable are presented as methods in solving certain boundary value problems of the wave or heat conduction equation involving wedge or conically shaped boundaries. Tables are appended for the various transforms. (Author)

AD-267 239 Div. 15
(TISTP/MFA) OTS price $10.10

Columbia U., New York.
ON THE COMPOUND DECISION PROBLEM IN THE NONSEQUENTIAL AND THE SEQUENTIAL CASE,
by Ester Samuel. 17 Nov 61, 122p. (Rept. no. CU-60-61)
(Contract Nonr-26633, Proj. NR 042-034)
Unclassified report

DESCRIPTORS: (*Sequential analysis, Distribution theory, Probability, *Games theory, Statistical tests, *Statistical analysis.)

The compound decision problem is considered where one is confronted with a sequence of n elementary or component decision problems of the same structure. Only the case where the elementary decision problem is that of testing a simple hypothesis against a simple alternative is considered. It can thus be stated as follows: The random variable X is distributed according to P sub theta, where P sub theta is completely specified for theta equals 0,1. (Author)

Division 15 - MATHEMATICS

AD-267 242 Div. 15, 8
(TISTP/MFA) OTS price $5.60

Parke Mathematical Labs., Inc., Carlisle, Mass.
RELATIONS BETWEEN SWITCHING NETWORKS AND BOOLEAN FORMULAS,
by Lorenzo Calabi. Mar 61, 49p. incl. illus. 15 refs. (Scientific rept. no. 8)
(Contract AF 19(604)3471)
(AFCRL-153) Unclassified report

DESCRIPTORS: (*Algebras, *Switching circuits, Relays, *Microwave networks, Matrix algebra, Triggered gates.) (Theory, Scheduling.)

A detailed study of relay networks is started, in parallel to the theory of boolean formulas (not functions). Similar problems for gate networks are attacked. The ultimate aim is the solution of minimization problems, for which several results are obtained. (Author)

AD-267 243 Div. 15
(TISTP/MFA) OTS price $5.60

Parke Mathematical Labs., Inc., Carlisle, Mass.
FOUNDATIONS FOR A GENERAL THEORY OF BOOLEAN FORMULAS II,
by J. A. Riley. Mar 61, 50p. (Scientific rept. no. 9)
(Contract AF 19(604)3471)
(AFCRL-154) Unclassified report

DESCRIPTORS: (*Algebras, Theory, Analysis, Operators (Mathematics), Transformations (Mathematics), *Scheduling.)

The development of the theory of Boolean formulas is presented. The topics treated are: minimal formulas, theory of essential letters, the algebra of minimal formulas, duality theory and the theory of simplification operators. (Author)

AD-267 250 Div. 15
(TISTP/MFA) OTS price $3.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
TRANSFINITE DIAMETER AND ANALYTIC CONTINUATION OF FUNCTIONS OF TWO COMPLEX VARIABLES,
by M. Schiffer and J. Siciak. 16 Oct 61, 31p. (Technical rept. no. 100)
(Contract Nonr-22511, Proj. NR-041-086)
Unclassified report

DESCRIPTORS: (*Complex variables, Functions, *Mathematical analysis, Integral equations, Matrix algebra, Topology, Combinatorial analysis.)

An extension to Polya's result to the theory of analytic functions in two (and more) complex variables is presented. An estimate for the singular set of a function in terms of the coefficients of a power series element is given. Applications will be made which throw a new light upon the geometry of domains in the complex z-plane whose boundary has a given transfinite diameter. Some asymptotic results which allow the calculation of the transfinite diameter of a planar domain by means of the kernel function of this domain is obtained. The definitions of a transfinite diameter of product sets in the space of two complex variables as well as extensions of these definitions in the case of more than two complex variables is discussed. (Author)

AD-267 254 Div. 15, 28, 32
(TISTP/MFA) OTS price $2.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
A VARIABLE THRESHOLD MODEL FOR SIGNAL DETECTION,
by Richard C. Atkinson. 17 Nov 61, 24p. incl. illus. (Technical rept. no. 42)
(Contract AF 49(638)1037)
(AFOSR-1589) Unclassified report

DESCRIPTORS: (Auditory signals, Detection, Signal-to-noise ratio, *Tonal thresholds.) (*Psychology, Conditioned reflex, Auditory perception.) (Statistical analysis, *Sampling, Probability.)

An analysis of some simple detection experiments in terms of Stimulus Sampling Theory is presented. The type of study to be considered is a choice experiment for which the experimenter has established, and explained to the subject, a one-to-one correspondence between the response set (A1, A2,...,Ar) and the stimulus presentation set (S1, S2,...,Sr) . On each trial a stimulus is presented and the subject attempts to identify the stimulus by making the appropriate response. (Author)

AD-267 272 Div. 15, 26
(TISTP/MFA) OTS price $2.60

Case Inst. of Tech., Cleveland, Ohio.
SEQUENTIAL QUEUING MODELS: OPTIMIZING SERVICE SYSTEMS BY VARYING THE SERVICE CAPACITY,
by Halim Dogrusoz. 19 June 61, 19p. incl. illus.
(Contract Nonr-114108)
Unclassified report

DESCRIPTORS: (*Sequential analysis, *Probability, Management engineering.) (Casts, Functions, Equations, *Operations research.)

To date, queuing theory was primarily concerned with determining the number of service facilities that should be designed into a system which provides service of random duration for demands which arrive randomly. It is generally assumed that all the available facilities will be in operation: Here, how to vary the service capacity of available facilities which are in operation as a function of queue length is considered so as to minimize the total cost of system operation. The single-station problem is discussed generally. A mathematical model is constructed and techniques for solving it are presented. The possibilities of extending the findings to multiple-service channels are indicated. Finally the advantages and disadvantages of the procedure are discussed. (Author)

AD-267 287 Div. 15
(TISTP/MFA) OTS price $2.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
ON GENERALIZED AXIALLY SYMMETRIC POTENTIALS,
by R. P. Gilbert. Oct 61, 22p. incl. illus.
(Technical note no. BN-262)
(Contract AF 49(638)228, Proj. 17501)
(AFOSR-1613) Unclassified report

DESCRIPTORS: (*Mathematical analysis, Differential equations, *Operators (Mathematics), Integrals, Complex variables, *Axially symmetric flow, Harmonic analysis, Polynomials, *Numerical analysis.)

Certain properties of generalized axially symmetric potentials (GASP) are investigated by means of integral operator methods. A modified form of the residue theorem is obtained. In addition, the Hadmard criteria concerning the expansion coefficients of a meromorphic function and its singularities seem to hold also for GASP. (Author)

AD-267 296 Div. 15
(TISTP/MFA) OTS price $4.60

Princeton U., N. Y.
ON THE CONVERGENCE OF THE LEARNING PROCESS IN A 2 x 2 NON-ZERO-SUM TWO-PERSON GAME.
Rept. on Econometric Research Program,
by Koichi Miyasawa. 10 Oct 61, 42p. (Research memo. no. 33)
Unclassified report

DESCRIPTORS: (*Games theory, *Learning, Statistical processes, Transformations (Mathematics), Numerical methods and procedures, Matrix algebra.)

A problem is presented as follows: Will a learning process give rise to an equilibrium point; that is, will a sequence of mixed strategies xk, yk associated with a learning process converge to equilibrium strategies x*, y*, of the game, when k increases infinitely. This is one of the open problems in game theory. (In the case of zero-sum two-person games, the affirmative answer is given.) The purpose in this discussion is to show that the answer to the above question is affirmative in the case of m equals n equals 2. (Author)

AD-267 298 Div. 15, 6
(TISTP/MFA) OTS price $3.60

Princeton U., N. J.
MIXED AND BEHAVIOR STRATEGIES IN INFINITE EXTENSIVE GAMES.
Rept. on Econometric Research Program,
by Robert J. Aumann. 6 Oct 61, 34p. incl. illus. (Research memo. no. 32)
Unclassified report

DESCRIPTORS: (*Games theory, *Flight paths, *Radar.) (Statistical analysis, Distribution theory, Probability, Measure theory.) (Transformations (Mathematics), Real variables, Topology.)

Analysis concerns infinite extensive games -- not necessarily of perfect information -- in which there may be a continuum of alternatives at some or all the moves; the games may also have unbounded or infinite play length. The object is to define the notion of mixed strategy for such games, and to use this definition to prove the appropriate generalization of Kuhn's theorem on optimal behavior strategies in games of perfect recall (K). The methods give a solution to the conceptual problem (Introduction to the Theory of Games, McGraw Hill, 1952) raised by McKinsey under the heading games played over function space. (Author)

AD-267 309 Div. 15
(TISTP/MFA) OTS price $1.60

Mathematics Research Center, U. of Wisconsin, Madison.
COALITION BARGAINING IN N-PERSON GAMES,
by Evar D. Nering. Sep 61, 18p. incl. table.
(Technical summary rept. no. 243)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: (*Games theory, *Management engineering, Numerical analysis, Probability, Personnel.)

A theory which deals with a restricted type of coalition formation in n-person games for relatively small values of n is presented. It is a normative, rather than a descriptive, theory in that it provides a rational estimate of the bargaining position of each player in terms of his position in the structure of the game. N-person zero-sum games are considered in which the sole strategic maneuvers are the formations of coaltitions. When a coalition S is formed, the rules shall specify a payment v(S) to the coalition as a whole. Nothing is specified about the payments to individuals within a coalition. That is left for the bargaining process. (Author)

AD-267 338 Div. 15
(TISTP/MFA) OTS price $2.60

Adelphi College, Garden City, N. Y.
ASYMPTOTIC FACTORIZATION OF PERTURBED WIENER-HOPF PROBLEMS,
by Herbert C. Kranzer and James Radlow. Nov 61, 25p. (AGM Rept. no. 101)
(Contract Nonr-336001, Proj. NR 041-252)
Unclassified report

DESCRIPTORS: (Factor analysis, Perturbation theory, Integral equations, Integration, Functions, Complex variables, *Algebra.)

Asymptotic factorization is applied to the problem of obtaining an approximate solution to an inhomogeneous Wiener-Hopf equation with a perturbed kernel k equals k(t) + epsilon m(t), when the solution of the equation is known for epsilon equals o. (Author)

AD-267 427 Div. 15, 8
(TISTP/MFA) OTS price $3.60

Case Inst. of Tech., Cleveland, Ohio.
ALTERNATE FORMS OF RICHARDS THEOREM,
by William S. Wagner. 31 May 61, 31p. incl. illus. (Scientific rept. no. 24)
(Contract AF 19(604)3887)
(AFCRL-790) Unclassified report

DESCRIPTORS: (*Statistical analysis of *Electrical networks, *Synthesis.) (Factor analysis, Special functions, Errors.)

An aid to the Bott-Duffin Synthesis procedure is obtained by finding an alternate form for Richards Theorem. This form is displayed for any general RLC driving point impedance Z(S), where Z(S) is a positive real function, (PRF), and its advantages are illustrated. In the special case when Z(S) is of rank six a method is devised employing the new form of Richards theorem which further simplifies the Bott-Duffin process. An alternate method is shown for finding K1 and K for the Synthesis by Cancellation of Zeros technique when Z(S) is of rank six. (Author)

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AD-267 463 Div. 15
(TISTP/MFA) OTS price $1.10

North Carolina State Coll., Raleigh.
ON THE SIMPLE PENDULUM UNDER PERIODIC DISTURBANCE,
by Raimond A. Struble. Sep 61, 9p. incl. illus. (Technical memo. no. 8)
(Contract DA 36-034-ORD-2733, Proj. TB2-0001)
(AROD rept. no. 2125:16)
Unclassified report

DESCRIPTORS: (*Harmonic analysis, *Harmonic oscillators, Oscillation, Perturbation theory, Vibration.) (Equations of Motion, Differential equations, Series.)

The motion of a simple pendulum under periodic disturbance near resonance is examined. It is shown that the general perturbational solution of the equation of motion exhibits long-period beats which are centered about the stationary oscillations. (Author)

AD-267 470 Div. 15, 13
(TISTM/TCG) OTS price $2.50

National Aeronautics and Space Administration, Washington, D. C.
THE USE OF HIGHER-ORDER DIFFERENCE METHODS IN BEAM VIBRATION ANALYSIS,
by Donald T. Greenwood. Dec 61, 117p. incl. illus. tables, 11 refs. (NASA Technical note no. D-964)
(In cooperation with Michigan U., Grant NsG-63-60)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-964.

DESCRIPTORS: (*Beams, Cantilever beams, Vibration mechanisms, *Dynamics, Mathematical analysis, Differential equations, Matrix algebra and Analog computer.) Structures.

Simple and higher-order difference methods for the solution for the natural frequencies of vibration of a uniform beam are compared. The same basic higher-order method is used throughout for the interior cells, but three different methods of boundary-condition representation are given. Tables and graphs of the error in mode frequencies, as compared with a continuous beam, are given for the various methods as a function of the number of cells. It is concluded that higher-order methods improve accuracy for a given number of cells, with essentially no change in the quantity of computing equipment required. (Author)

AD-267 511 Div. 15, 16
(TISTP/MFA) OTS price $2.60

California U., Los Angeles.
SYNTHESIS OF OPTIMAL CONTROLLERS FOR A CLASS OF MAXIMIZATION PROBLEMS,
by Masanao Aoki. Sep 61, 18p. incl. illus.
(Rept. no. 61-62)
(Contract Nonr-23352)
Unclassified report

DESCRIPTORS: (*Games theory, Potential theory, *Control, Processing.) (Mathematical analysis, Linear systems, *Industrial plants.)

A class of final value control problems are presented where the outputs of linear plants with time varying input upper bounds are to be maximized with a cost of control c(t)z(t) at time t, where a bounded control variable z(t) generates an actual input y(t) to the plants via an integrator. (Author)

AD-267 516 Div. 15, 5
(TISTP/MFA) OTS price $2.60

California U., Los Angeles.
ON MINIMIZING INTEGRALS OF ABSOLUTE DEVIATIONS IN LINEAR CONTROL SYSTEMS,
by Masanao Aoki. Oct 61, 20p. incl. illus.
(Rept. no. 61-66)
(Contract Nonr-23352)
Unclassified report

DESCRIPTORS: (*Control systems, *Linear systems, Quality control, *Measure theory.) (Statistical analysis, Probability, Sampling, Integrals, Functions.)

One of the common objectives of many control systems is to make outputs of the systems follow some functions as closely as possible. The functions to be duplicated by the outputs may be the signal part of the inputs to the systems or desired signals of some kind. Thus, it is often desired to build a control system which produces the output which follows the known functions most closely in terms of the appropriately defined criterion function. Given such a criterion function, one may be in a position to give some partial ordering to various control laws (or control policies) to be mechanized, and thus may be able to choose the law best suited for the job. (Author)

AD-267 537 Div. 15
(TISTP/MFA) OTS price $1.10

Lincoln Lab., Mass. Inst. of Tech., Lexington.
A CRITIQUE OF WILCOX'S METHOD OF AMBIGUITY FUNCTION SYNTHESIS,
by William S. Widnall. 28 Nov 61, 9p. (Rept. no. 34G-1)
(Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: (Functions, Analysis of variance, Synthesis, *Matrix algebra, Integral equations.) (*Mathematical analysis, Radar signals.) Wave analysis.

AD-267 572 Div. 15
(TISTP/MFA) OTS price $9.10

Institute of Statistics, North Carolina U., Chapel Hill.
ON THE GENERAL RENEWAL PROCESS,
by V. K. Murthy. Apr 61, 99p. incl. illus.
(Mimeograph series no. 293)
(Contract Nonr-85509)
Unclassified report

DESCRIPTORS: (*Statistical processes, *Probability, Statistical distributions, Integral transforms, Taylor's series, Integration.) Theses.

Some problems that arise on Renewal theory and its ramifications and the discussson thereon are

presented. The dissertation is divided into three parts. In the first part, theory on the cumulants of a renewal process are extended to the case of a general renewal process. In the second part an estimate is proposed for the estimation of the variance-time curve of a renewal process. Assuming equilibrium it is shown that this estimator is asymptotically unbiased for any underlying renewal process. In the third part it is shown that a certain generalization of renewal theory proposed by Hammersley (J. R. Statist. Soc. B, 20:243-302, 1958) is essentially included in Smith's theory of cumulative processes. (Author)

AD-267 577 Div. 15
(TISTP/MFA) OTS price $4.60

RIAS, Inc., Baltimore, Md.
THE THEORY OF OPTIMAL CONTROL AND THE CALCULUS OF VARIATIONS,
by R. E. Kalman. 1960, 31p. incl. illus. 15 refs. (Technical rept. no. 61-3)
(Contracts AF 49(638)382 and AF 33(616)6952)
(AFOSR-1121) Unclassified report

DESCRIPTORS: (*Calculus of variations, Scheduling, *Mathematical prediction, Combinatorial analysis, Algebraic topology, Differential equations, *Control, Theory.)

The hamiltonian theory of the calculus of variations is formulated for a wide variety of problems in the theory of control. The hamiltonian function is constructed with the aid of the Minimum Principle, which is the counterpart of the same principle due to Pontryagin. The canonical differential equations of Hamilton are shown to imply Pontryagin's theorem. A number of concrete examples are included. (Author)

AD-267 583 Div. 15
(TISTP/MFA) OTS price $1.10

Statistical Lab., U. of Calif., Berkeley.
FUNDAMENTAL RESEARCH IN MATHEMATICAL STATISTICS AND PROBABILITY--STOCHASTIC PROCESSES.
Final rept. 1 Aug 52-24 June 61,
by J. Neyman, Lucien LeCam and others. 5 Oct 61, 9p.
(Contract DA 04-200-ORD-171)
(AROD rept. no. 362:49)
Unclassified report

DESCRIPTORS: (*Statistical processes, Games theory, Probability, Research program administration.) *Bibliography.

AD-267 584 Div. 15, 33
(TISTP/MFA) OTS price $1.60

Operations Research Center, U. of Calif., Berkeley.
A NOTE ON SEMIDEFINITE MATRICES,
by Edmund Eisenberg. 20 July 61, 11p. (Research rept. no. 9; IER 172-10)
(Contract Nonr-22283)
Unclassified report

DESCRIPTORS: (*Statistical tests, Statistical analysis, *Matrix algebra, Polynomials, Transformations (Mathematics).)

It is of general interest to find criteria for a matrix to be positive (or negative)- semidefinite. The usual characterization of semidefinite matrices in terms of their principal minors can be rather laborious to implement practically. An elementary proof of a known alternate characterization of a semidefinite matrix in terms of its null-space and of its largest characteristic value is presented. An iterative procedure is also suggested which may be useful in deciding the semidefiniteness of a matrix. (Author)

AD-267 585 Div. 15, 33
(TISTP/MFA) OTS price $1.60

Operations Research Center, U. of Calif., Berkeley.
A TRAFFIC COUNTING DISTRIBUTION,
by Robert M. Oliver. 23 June 61, 10p. incl. illus. (Research rept. no. 7; IER 172-8)
(Contract Nonr-22283)
Unclassified report

DESCRIPTORS: (*Statistical distributions, *Trafficability, Traffic, *Counting methods, Probability, Statistical analysis.) (Experimental data, Equations, Integral transforms.)

A traffic counting distribution is derived in which a minimum spacing or headway between units of traffic is taken into account. A comparison is made between this probability distribution and the Type I Counter distribution derived by W. Feller (On Probability Problems in the Theory of Counters, Interscience Publishers 1948, p. 105). Explicit expressions are derived for the mean and variance of count as well as the probability that the interval of interest is completely filled by vehicles. (Author)

AD-267 586 Div. 15, 33
(TISTP/MFA) OTS price $4.60

Operations Research Center, U. of Calif., Berkeley.
DISTRIBUTION OF GAPS AND BLOCKS IN A TRAFFIC STREAM,
by Robert M. Oliver. 25 July 61, 45p. incl. illus. tables (Research rept. no. 10; IER 172-11)
(Contract Nonr-22283)
Unclassified report

DESCRIPTORS: (*Statistical distributions, Statistical processes, Trafficability, Traffic, Probability, Vehicles, Tests.) (Distribution theory, Statistical analysis, Transformations (Mathematics).)

Some theoretical questions of large openings or gaps in a single stream of traffic are studied. A gap is defined as a headway between vehicles greater than or equal to some minimum size -- say x. Several authors have studied the probability distribution of the wait which a randomly located observer must endure before he finds a gap. This paper, while briefly reviewing the solutions of this well known problem, is primarily concerned with expressions for: (1) the distribution of gap sizes; (2) the distribution of spacings between vehicles and gaps; (3) the mean and variance of inter-vehicle and inter-gap spacings; (4) the stationary flow rates of gaps; and (5) the distribution of blocked and unblocked periods. It is assumed that the origin of measurements may be located (1) with the passing of a vehicle, (2) at the beginning of a gap, or (3) at random. It is also assumed that the distribution of inter-vehicle spacings are independently, but identically, distributed random variables. (Author)

Division 15 - MATHEMATICS

AD-267 587 Div. 15, 33
(TISTP/MFA) OTS price $1.60

Operations Research Center, U. of Calif., Berkeley.
ZERO-ONE BUNCHING AND A PASSING RULE,
by Robert M. Oliver. 25 July 61, 14p. (Research rept. no. 16; IER 172-17)
(Contract Nonr-22283)
Unclassified report

DESCRIPTORS: (*Statistical processes, Combinatorial analysis, Statistical distributions, Probability, Trafficability, *Traffic, Vehicles, Tests.) (Sequential analysis, Differential equations, Difference equations.)

A discrete traffic counting distribution and a passing rule which lead to bunches of zero or one fast vehicle behind a slow vehicle are described. (Author)

AD-267 673 Div. 15
(TISTE/NTM) OTS price $2.60

Parke Mathematical Labs., Inc., Carlisle, Mass.
AN EXISTENCE PROOF FOR FREE BOOLEAN RINGS,
by John A. Riley. Aug 61, 8p. 13 refs. (Scientific rept. no. 2)
(Contract AF 19(604)7493)
(AFCRL-719) Unclassified report

DESCRIPTORS: (*Algebras, Theory, Scheduling, Mathematical logic, *Special functions.)

Techniques of universal algebra are used to prove the existence of the free Boolean ring generated by a given set. A certain representation theorem was obtained simultaneously which yields, in the finite case, the usual interpretation in terms of Boolean functions. (Author)

AD-267 686 Div. 15
(TISTP/JDP) OTS price $1.10

Cornell U., Ithaca, N. Y.
THE SEMI-GROUP PROPERTY OF POISSON TRANSFORMATION AND SNOW'S INVERSION FORMULA,
by Harry Pollard. July 61, 9p.
(Contract AF 18(600)685)
Unclassified report

DESCRIPTORS: *Integral transforms, *Groups (Mathematics), Theory, Potential theory.

AD-267 736 Div. 15, 8
(TISTP/MFA) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CALCULATING THE DEPENDABILITY OF COMPLEX AUTOMATIC SYSTEMS,
by A. M. Polovko. 3 Nov 61, 9p. incl. illus. tables (Trans. no. FTD-TT-61-146 of Izvestiya An SSSR, Otn, Energetika I Avtomatika, Issue no. 5:174-178, 1960)
Unclassified report

DESCRIPTORS: (*Electronic systems, Automatic, *Reliability, Tests, Failure.) (Resistors, Capacitors, Potentiometers, Diodes, Electric motors, Rectifiers, Motor generators, Gyroscopes, Relays, Delay lines, Oscillators, Vacuum tube rectifiers.) (Translations, USSR.)

Methods of calculating reliability of complex automatic systems are presented, based on assumptions, that failures are subject to Poisson distribution with validity of the exponential law of reliability. (Author)

AD-267 739 Div. 15, 9
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THE STABILITY OF THE MOMENTLESS STATE OF MULTIPLY ANISOTROPIC SHELLS,
by A. V. Sachenkov and V. G. Vybornov. 13 Nov 61, 16p. (Trans. no. FTD-TT-61-133 of Izvestiya Vysshikh Uchebnykh Zavedeniy Aviatisionnaya Tekhnika 4:61-71, 1960)
Unclassified report

DESCRIPTORS: (Stability, Moments, *Elastic shells, Deformation, Stresses, Surfaces, *Mathematical analysis, Differential equations.) (USSR, Translations, Technological intelligence.) Mechanics.

The stability of the elastic equilibrium of sloping shells subjected to combined loads was examined. The solution of the problem of the stability of elastic equilibrium is obtained by minimizing the integral expression involving the Lame parameters, the Gaussian coordinates on the surface of reduction, the energy of deformation per unit area of the surface of reduction, the energy expression for the first order of smallness and the energy of deformation for the 2-ply shell. The solution of the problem of the stability of sloping shells is obtained by minimizing the energy functional equation. Mathematical expressions are given for conditions relating to the stability of plates and shells (axial compression of a cylindrical shell; a spherical shell at uniform external pressures; and a sloping spherical shell, triangular in plan), and nonlinear problems of the stability of layered shells.

AD-267 741 Div. 15
(TISTP/MFA) OTS price $1.10

Rutgers U., New Brunswick, N. J.
AN APPROXIMATION TO THE DISTRIBUTION OF Q (A VARIATE RELATED TO THE NON-CENTRAL t),
by D. Hogben, R. S. Pinkham, and M. B. Wilk.
Aug 61, 7p. incl. table (Technical rept. no. N-7)
(Contract Nonr-40416)
Unclassified report

DESCRIPTORS: (*Statistical analysis, Statistical tests, Special functions, *Distribution theory, Probability, Density.) Tables.

A mathematical procedure which provides an easily available approximation to the distribution function of Q, or any monotone function of it, employing values of the beta distribution is presented and values of the mean and variance of Q for given theta and n are given. In particular, this approximation provides values for the probability integral of the non-central t (or any monotone function of it) for small non-centrality values. (Author)

AD-267 743 Div. 15
(TISTP/MFA) OTS price $1.60

Rutgers U., New Brunswick, N. J.
APPROXIMATE UNCORRELATING TRANSFORMATIONS FOR NORMAL ORDER STATISTICS,
by S. S. Shapiro and M. B. Wilk. 15 Aug 61, 17p. incl. tables (Technical rept. no. N-6)
(Contract Nonr-40416)
Unclassified report

DESCRIPTORS: (*Statistical analysis, Sampling, Least squares method, Transformations (Mathematics), Probability.) (Experimental data, *Tables.)

Preliminary work on a simplified linear transformation is reported which, when applied to an ordered normal sample, yields approximately uncorrelated random variables. (Author)

AD-267 783 Div. 15, 25, 2, 17
(TISTP/JW) OTS price $1.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
AN INTEGRAL EQUATION OCCURRING IN A PROBLEM OF SUBSIDENCE,
by J. H. Giese. Sep 61, 16p. (BRL Rept. no. 1149)
(DA Proj. 503-06-002)
Unclassified report

DESCRIPTORS: (*Mining engineering, Boundary layers.) (Numerical analysis, Differential equations, Integral transforms.) (*Underground structures, Motion, Soil, Plasticity.)

The linear boundary value problem that was solved previously by numerical methods (AD-260 329) is reformulated as a linear integral equation and solved by Laplace transform methods. (Author)

AD-267 796 Div. 15, 25
(TISTP/JDP) OTS price $1.10

Harvard U., Cambridge, Mass.
A QUANTUM-MECHANICAL SUM-RULE FOR INFINITE SUMS INVOLVING THE OPERATOR H/ ,
by L. Salem. 1961, 10p.
(Sponsored by the Office of Naval Research)
Unclassified report

Part of this paper was presented at the 10th Symposium on Molecular Structure and Spectroscopy (The Ohio State University, June 1961).

DESCRIPTORS: (*Quantum mechanics, *Series, Operators (Mathematics), Differential equations.) Partial differential equations.

The sum-rule for infinite sums is derived. Particular examples are considered, and a differential equation, relating the mass-dependence and coordinate-dependence of the wave function is derived. (Author)

AD-267 835 Div. 15
(TISTP/TL) OTS price $5.60

Mathematics Research Center, U. of Wisconsin, Madison.
AN ANALYTICAL APPROACH TO THE DIFFERENTIAL EQUATIONS OF THE BIRTH-AND-DEATH PROCESS.
Aug 61, 58p. (MRC Technical summary rept. no. 247)
(Contract DA 11-022-ORD-2059)
Unclassified report

DESCRIPTORS: (*Differential equations, Groups (Mathematics), Polynomials, *Statistical processes, Integral equations, Functions, Series, Complex numbers, Integral transforms, Inequalities, Probability, Measure theory, Transformations (Mathematics).)

This analysis presents a purely analytical approach to the problems of uniqueness and existence for the forward and/or backward differential equation of the so-called birth-and-death process. In this method of proof, neither the uniqueness nor the existence offers any great difficulty. The major effort is spent in obtaining for many cases of interest an explicit representation of all the possible solutions. (Author)

AD-267 853 Div. 15
(TISTP/TL) OTS price $4.60

Syracuse U., N. Y.
MEROMORPHIC FUNCTIONS WITH TWO VALUES DISTRIBUTED ON A FINITE NUMBER OF PATHS EXTENDING TO INFINITY,
by Albert Edrei. May 61, 43p.
(Contract AF 49(638)571)
(AFOSR-815) Unclassified report

DESCRIPTORS: (*Complex variables, *Bessel functions, *Measure theory, Functions, Special functions, Inequalities, *Integral transforms, Differential equations, Polynomials, Integration.)

Let f(z) be a meromorphic function such that all its zeros and poles lie on a finite number of regular, separated paths extending to infinity. (The exact definitions of regular and separated are defined.) It is shown that if T(T does not equal zero, T does not equal infinity) is a deficient value (in the sense of Nevanlinna) of f(z), or of any one of its derivatives, there must exist severe restrictions on the order Lambda of f(z). In fact, Lambda must be finite and cannot exceed a bound depending only on the configuration of the paths carrying the zeros and poles of f(z). This shows that, if three distinct values, finite or infinite, are distributed on a finite number of paths and if the order of f(z) is infinite, or finite but large enough, then no value, finite or infinite, may be deficient. In particular, entire functions of infinite order cannot have two finite values distributed on a finite number of regular, separated paths. (Author)

AD-267 860 Div. 15, 12
(TISTP/TL) OTS price $6.60

Stanford U., Calif.
PONTRYAGIN'S MAXIMUM PRINCIPLE AND OPTIMAL CONTROL,
by I. Flugge-Lotz and H. Halkin. 15 Sep 61, 65p. incl. illus. 22 refs. (Technical rept. no. 130)
(Contract AF 49(638)513)
(AFOSR 1489) Unclassified report

DESCRIPTORS: (*Algebraic topology, *Functional analysis, *Control systems, *Differential equations, Partial differential equations, Integra-

tion, Matrix algebra, Functions.) (Control, Theory, Analysis, *Conical bodies, *Parabolic bodies, Oscillation, Damping, Flutters, Geometry, Optics, Functional analysis.) (Vector analysis, Operators (Mathematics), *Guided missile trajectories.) Wave analysis.

The mathematical formulation of the most general problem of Optimal Control can be considered as a problem of Mayer subjected to unilateral constraints, i.e., to certain restrictions expressible in terms of inequalities. Results of the classical calculus of variations in their usual forms cannot give a general solution to this problem because, among other things, the fundamental relation of the calculus of variations, i.e., the equation of Euler-Lagrange, is valid only in the case of points interior to the set of admissible points. The most general solution is given by the Maximum Principle of Pontryagin, but in its present form this principle cannot be applied in certain situations, and its validity has been proved in particular cases only. A derivation of this principle for the most general case is given. (Author)

AD-267 900 Div. 15, 25
(TISTP/MFA) OTS price $2.60

Illinois U., Urbana.
ASYMPTOTIC EXPANSION OF THE BARDEEN-COOPER-SCHRIEFFER PARTITION FUNCTION BY MEANS OF THE FUNCTIONAL METHOD,
by B. Muhlschlegel. 1961, 29p. illus. 14 refs.
(Contract Nonr-183412)
Unclassified report

DESCRIPTORS: (*Operators (Mathematics), Series, Functions, *Quantum stutistics, Measure theory.) (*Superconductivity, Thermodynamics.)

The canonical operator associated with BCS model Hamiltonian of superconductivity is represented as a functional integral by the use of Feynman's ordering parameter. General properties of the partition function in this representation are discussed. Taking the inverse volume of the system as an expansion parameter, it is possible to calculate the thermodynamic potential including terms independent of the volume. This yields a new proof that the BCS variational value is asymptotically exact. The behavior of the canonical operator for large volume is described and related to the state of free quasiparticles. A study of the terms of the thermodynamic potential which are of smaller order in the volume in the low temperature limit shows that the ground state energy is non-degenerate and belongs to a number eigenstate. (Author)

AD-267 959 Div. 15
(TISTP/TL) OTS price $2.60

Institute for Fluid Dynamics and Applied Mathematics, U. of Maryland, College Park.
BOUNDS IN THE NEUMANN PROBLEM FOR SECOND ORDER UNIFORMLY ELLIPTIC OPERATORS,
by J. H. Bramble and L. E. Payne. Nov 61, 17p.
(Technical note BN-266)
(Contract AF 49(638)228)
(AFOSR-1759) Unclassified report

DESCRIPTORS: (*Operators (Mathematics), *Partial differential equations, Inequalities, Integrals, Differential geometry.) (Spheres, Vector analysis, Matrix algebra.)

In this analysis, lower bounds are established for certain eigenvalues. These inequalities lead to explicit a priori bounds in the Neumann problem for second order elliptic operators. (Author)

AD-267 982 Div. 15
(TISTP/MFA) OTS price $3.60

Pennsylvania U., Philadelphia.
TRANSFORMATIONS AND DISCOURSE ANALYSIS PROJECTS 40. CONJUNCTION WITH AND,
by Lila R. Gleitman.
Nov 61, 34p. incl. illus.
Unclassified report

DESCRIPTORS: (*Sequential analysis, Scheduling, Transformations (Mathematics).) (*Philology, Language, Vocabulary.)

Transformational grammarians usually suppose that deletions occur on the output of the conjunction rule. The deletions account for the fact that and ordinarily does not stand between two complete sentences. One could suppose as easily that some sub-part of one sentence could be embedded onto another sentence with and appearing at the point of embedding. Either of these descriptions would serve the purpose. The former was chosen. (Author)

AD-267 995 Div. 15, 25
(TISTP/MFA) OTS price $1.60

Queen's U., Belfast (Gt. Brit.).
RESONANCE CHARGE TRANSFER BETWEEN H(is) AND H+ USING AN APPROXIMATION BASED ON AN EXPANSION IN MOLECULAR EIGENFUNCTIONS,
by A. F. Ferguson. 1961, 16p. illus.
(Contract N62558-2637)
Unclassified report

DESCRIPTORS: (*Perturbation theory, Functions, Bessel functions, Wave analysis, Series.) (*Transport properties, Protons, Energy, Resonance, Molecules, *Hydrogen, Isotopes.)

AD-268 032 Div. 15
(TISTP/JW) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
STEP-BY-STEP DECODING IN GROUPS WITH A WEIGHT FUNCTION. PART I,
by Eugene Prange. Aug 61, 13p. incl. illus.
(Rept. no. AFCRL 716)
(Proj. 5632) Unclassified report

DESCRIPTORS: (*Groups (Mathematics), *Coding, Theory, Errors, Analysis.) (Atomic structure, Atomic weight, Decomposition.)

Let G be a group with a weight (norm) w, and thus a distance. Let H be a normal subgroup of G. A basic lemma connects w-decomposition in G with that in the factor group G/H. One application is the justification of a general, operationally useful, concept of step-by-step decoding of G into H. A second application is

to the study of a question of Slepian's: When can a set of unique coset representatives, one element of minimal weight from each H-coset, be chosen so that this set of representatives is closed under descendance. A sufficient condition, independent of H, is proved. In particular, the answer is positive for groups G with Hamming or Lee weight functions. (Author)

16. MEDICAL SCIENCES

AD-267 104 Div. 16
(TISTB/LH) OTS price $2.60

St. Louis U., Mo. School of Medicine.
CUTANEOUS BLOOD FLOWS IN CALF, FOREARM, CHEEK AND EAR DURING CHANGING AMBIENT TEMPERATURE.
Rept. on Physiology of Flight,
by Leo C. Senay, Jr., Margaret L. Christensen, and Alrick B. Hertzman. Mar 61, 16p. incl. illus. 11 refs.
(Contract AF 33(616)7077, Proj. 7164)
(WADD TR 61-190) Unclassified report

DESCRIPTORS: (*Cattle, Blood vessels, Dilation, *Blood circulation, *Skin, Body temperature, Heat, Stress (Physiology).)

When seminude subjects were exposed to heat, the onset of cutaneous vasodilatation occurred simultaneously in the calf, forearm, cheek and ear. Progress of vasodilatation in the calf and toe often differed from that in the forearm, cheek and ear. Vasodilatation in the calf was either small or stabilized early while the forearm vessels continued to dilate markedly. One subject, a poor sweater with unusually high skin temperatures, repeatedly presented an exception in that vasodilatation in the calf exceeded that in the forearm. The usual failure of skin temperature to rise as much in the calf as in the forearm appeared to be related to the lesser cutaneous vasodilatation. There was no evidence that local sweating elicited local vasodilatation. (Author)

AD-267 130 Div. 16, 26
(TIPTM/EJH) OTS price $9.60

Kettering Lab., U. of Cincinnati, Ohio.
WORKSHOP ON BERYLLIUM JANUARY 5 AND 6, 1961.
1961, 111p. incl. illus. tables, 77 refs.
(Contract AF 33(600)37211)
Unclassified report

DESCRIPTORS: (Diseases, Respiratory diseases, *Beryllium poisoning, *Metal poisoning, Poisoning, *Industrial medicine, Diagnosis.) (Industrial production, Industrial plants, *Beryllium, Beryllium compounds, Toxicity, Hazards, Handling, Atmosphere, Contamination.) (*Symposia, Bibliography.)

CLINICAL AND DIAGNOSTIC CONSIDERATIONS: Criteria for berylliosis diagnosis should include: exposure evidence; clinical features; pulmonary function, histological and pathological tests. ANALYTICAL, EXPERIMENTAL AND ENVIRONMENTAL CONSIDERATIONS: The over-all validity of the present standard as to the permissible concentration of Be in the air of industrial establishments cannot be established definitely until better comprehensive clinical and epidemiologic investigations have been conducted. EPIDEMIOLOGICAL CONSIDERATIONS: Evidence indicates the following associations exist: (1) Causes of acute berylliosis:- positive association: low-fired oxide, Be salts, Be(OH)2; negative association: Be ore, phosphors, high-fired oxide: questionable: metal: (2) Causes of chronic berylliosis:- positive association: BeO, phosphors high-fired, Be-Cu in fume; negative association: BeO as dust: questionable: low-fired phosphors.

AD-267 137 Div. 16, 14, 17
(TISTA/SEB) OTS price $8.60

Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.
EVALUATION OF LIQUID STERILANTS.
Final rept.,
by John B. Opfell, Curtis E. Miller, and Philip N. Hammons. 28 Aug 61, 79p. incl. illus. tables (Rept. no. R-6-P-32)
(Contract NASw-6) Unclassified report

DESCRIPTORS: (Metals, Decontamination by Liquids, *Sterilizers, Effectiveness, Feasibility studies, Tests, Test methods, Mathematical analysis, Statistical analysis.) (Ethylenes, Imines.) (Propanes, Epoxides, Chlorides or Bromides.) (Propionic acid, Lactones.) (Microorganisms, Bacillus subtilis.) Formaldehyde, Magnesium alloys, Solvates.

A study was conducted to evaluate chemicals from the sterilizing and the compatibility standpoints with respect to a wide variety of materials. The 5 chemicals investigated were based on ethylene oxide and were used with common solvents. Phase I dealt with the relative effectiveness of 30 chemical-solvent combinations in sterilizing an Mg alloy strip. All other factors (such as temperature and time of exposure) were held at arbitrary levels. B. Subtilis, var. niger was the microorganism used. Because of the low volatility of most of the chemicals, the relative concentration of materials changed continuously. Phase II dealt with the effectiveness and compatibility of 4 specific sterilants in relation to a variety of surfaces, materials, and configurations. Results indicate that absolute sterility tests can be designed and confirm the feasibility of developing a satisfactory reliable process for sterilizing a specified surface.

AD-267 143 Div. 16
(TISTB/LH) OTS price $1.60

Aerospace Medical Lab., Aeronautical Systems Div., Wright-Patterson Air Force Base, Ohio.
EXPERIMENTAL MOUSE CAPSULE WITH LIFE SUPPORTING SYSTEM.
Rept. on Equipment for Life Support in Aerospace,
by Konrad Weiswurm. Aug 61, 7p. incl. illus.
(Proj. 6373)
(ASD TR 61-323) Unclassified report

DESCRIPTORS: *Space capsules, Laboratory animals, Closed cycle ecological system, Atmosphere, Potassium compounds, Oxides.

To determine the basic requirements needed to furnish a sealed atmosphere suitable for sustaining life, a 12-inch sphere housing a mouse cage, 2-week food and water supply, atmosphere control units, and photographic equipment was designed

and built for laboratory testing. Several methods of atmosphere control were tested using drierite, calcium chloride, gaseous oxygen, and potassium superoxide. Potassium superoxide in this application performs three functions in a single process-it absorbs carbon dioxide, it absorbs water vapor, and it releases oxygen. It makes possible an atmosphere regeneration system having no fans or other air-circulation devices; thus resulting in higher reliability. Three tests using potassium superoxide, each lasting two weeks, were very successful and demonstrated the advantages of this method. (Author)

AD-267 228 Div. 16
(TISTB/LH) OTS price $3.60

Milan U. (Italy).
CHOLESTEROL AND FATTY ACID BIOSYNTHESIS IN BRAIN.
Annual technical rept. 1 Aug 60-31 July 61,
by S. Garattini, L. Bizzi and others. 31 July 61, 33p. incl. tables.
(Contract DA 91-591-EUC-1541)
Unclassified report

DESCRIPTORS: (*Fatty acids, *Brain, Liver, Lipids, *Cholesterol, Biosynthesis, Laboratory animals.)

The problem of cholesterol biosynthesis in brain of suckling rats was studied. The effect of experimental conditions known to affect liver cholesterol and brain lipid synthesis was studied. The administration of Triton WR 1339 results in an increase of cholesterol synthesis in liver and, to a lesser degree, in brain when 1- C14 acetate, but not 2- C14 mevalonolactone, is used as precursor. Gamma-irradiation increases the cholesterol synthesis in liver but shows an opposite effect on such a synthesis in brain. After partial hepatectomy there is an increase of cholesterol synthesis in regenerating liver, using acetate as precursor, but no change occurs in brain. Exposure to low oxygen tension considerably decreases cholesterol synthesis in liver but shows no effect on brain. Thyroxine analogues, biphenylacetic acid derivatives, nicotinic acid, benzmalacene, MER-29, heparinoid and hexoestrol at various dose levels, do not affect the concentration of brain cholesterol. (Author)

AD-267 249 Div. 16
(TISTB/LH) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
MICROBIOLOGIC STUDIES WITH OZONE. SOME NOTES ON CONDUCTING EXPERIMENTS WITH OZONE,
by Irving Davis. June 61, 14p. incl. illus. tables, 45 refs. (Rept. no. 61-80)
Unclassified report

DESCRIPTORS: (*Microbiology, *Ozone, Chemical analysis.) Laboratory equipment.

The technology of ozone research is detailed for the neophyte in this field. A method for construction of an ozonator is described. The instrument is calibrated in terms of relation of primary to secondary voltage, relation of electrical input and oxygen flow rate to ozone production, and reproducibility. The defects inherent in such an instrument are noted. Auxiliary equipment and technics required during ozonization are mentioned. A comparative evaluation of several dispersion devices for gas absorption bottles is reported. The Allihn bell-bubbler type of absorber is recommended. Chemical methods for the analyses of ozone in either the gas or liquid phases are reviewed. A comparison of methods for the analyses of ozone in the gas phase reveals that multiplication of the spectrophotometric results by the factor 1.6 brings this analytic method into approximate agreement with the titrimetric method. Finally, some kinetic data on ozone in aqueous solutions are reported. The latter studies include decomposition of ozone in aqueous solutions, effect of dilution on ozonated-water solutions, and use of different absorbing media for ozone. (Author)

AD-267 251 Div. 16
(TISTB/LH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
MICROBIOLOGIC STUDIES WITH OZONE. QUANTITATION OF OZONE IN AQUEOUS SOLUTIONS,
by Irving Davis. June 61, 6p. incl. illus. table, 11 refs. (Rept. no. 61-78)
Unclassified report

DESCRIPTORS: *Microbiology, *Ozone, Chemical analysis, Solutions, Spectrophotometers.

A spectrophotometric method for the determination of ozone dissolved in aqueous solution is described. Principle of the method is based on the absorption of ozone in alkaline potassium iodide solution. Iodine is released upon acidification and the chromophoric properties quantitated at the maximum absorption peak in the visible spectra. This method is rapid and accurate within the range of 0.02 to 4.0 mg. ozone per liter of water. Other methods reported in the literature are reviewed. (Author)

AD-267 252 Div. 16
(TISTB/LH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
CONTRIBUTION OF THE PAROTID GLANDS TO WHOLE SALIVA VOLUME,
by Ira L. Shannon. Nov 61, 4p. incl. illus. (Rept. no. 62-6)
Unclassified report

DESCRIPTORS: *Saliva, Salivary glands, Physiology, Stimulation, Volume.

A total of 120 pairs of parotid and extra-parotid fluid specimens were collected simultaneously under differing forms of elicitation from 30 healthy young adult males. Under increasing intensity of rubber band stimulation, the percentage contribution of the parotids to whole saliva volume increased progressively from 41.4 to 48.6%. This rise was due almost entirely to increased parotid flow rate since the extra-parotid flow did not increase significantly. With pilocarpine as the stimulating agent, the parotid contribution increased from 40.7 to 48.1 percent as flow rate increased. The rate of elaboration of both types of oral fluid increased significantly with this stimulant. For the entire study the mean parotid gland contribution was 45.2 percent. This contribution varied directly with the flow rate of whole saliva. (Author)

AD-267 253 Div. 16
(TISTB/LH) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
PAROTID FLUID CHLORIDE CONCENTRATION AT EXTREMELY LOW RATES OF FLOW,
by Ira L. Shannon and Gerald M. Isbell. Nov 61, 5p. incl. illus. tables (Rept. no. 62-15)
Unclassified report

DESCRIPTORS: (*Chlorides, Physiology, *Saliva, Biochemistry.)

Parotid fluid was collected under conditions of very minimal stimulation from 527 healthy young adult male subjects. At a mean flow rate of 0.042 (S.D., 0.030) ml./minute, the chloride mean was found to be 24.78 (S.D., 7.64) mEq./liter. The serum chloride mean for all participants was 101.9 (S.D., 2.61) mEq./liter. At this very low rate of flow, a negative correlation (r = -0.25) was found between flow rate and chloride concentration. This was significant at the 1% level. The nature of the flow-rate dependence of the chloride ion varies with the flow-rate range, coefficients varying from significantly negative to significantly positive. The shifts of sodium and potassium between the duct cells and saliva are held responsible for this difference in chloride response. (Author)

AD-267 257 Div. 16
(TISTB/LH) OTS price $2.60

Johns Hopkins U. School of Medicine, Baltimore, Md.
THE PHARMACOLOGICAL PROPERTIES OF AN EVOKED POTENTIAL IN THE MIDBRAIN RETICULAR FORMATION.
Rept. for July 58-Dec 59,
by Thomas W. Langfitt. Aug 61, 23p. incl. illus. table.
(Contract DA 18-108-cml-6425)
(CRDL Special pub. no. 2-43)
Unclassified report

DESCRIPTORS: (*Brain, *Spinal cord, *Drugs, Barbiturates, Lysergic acid derivatives, Electrical properties, Electroencephalography, Electric potential.)

This study was made to determine whether brain stem evoked potentials could be altered by a variety of pharmacological agents. Evoked potentials in the midbrain reticular formation and in the posterior lateral ventral nucleus of the thalamus (VPL) were studied in 31 cats. The results show that there was no consistent alteration in the evoked potentials following the administration of any drug except pentobarbital. Pentobarbital depresses the evoked potential in the midbrain reticular formation of the cat. The locus of action of lysergic acid diethylamide (LSD) chlorpromazine, physostigmine, atropine, adrenaline, gamma aminobutyric acid (GABA), succinylcholine, mecholyl, and reserpine either is not at the recording sites investigated in this study (midbrain reticular formation and posterior lateral ventral nucleus of the thalamus), or the alterations in electrical activity produced by the drugs are too subtle to be detected by the methods used. (Author)

AD-267 258 Div. 16
(TISTB/LH) OTS price $1.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
ISOLATION FROM HUMAN URINE AND PRELIMINARY CHARACTERIZATION OF A PAM METABOLITE,
by Bernard Kramer. Sep 61, 17p. incl. illus. table, 13 refs. (Rept. no. CRDLR 3083)
Unclassified report

DESCRIPTORS: (*Drugs, *Oximes, *Pyridines, Iodides, Methyl radicals, Urine, Chemical analysis, Separation, Biochemical tests, Fluorescent dyes.)

PAM iodide and a metabolite of PAM iodide were isolated and obtained chromatographically pure from human urine after administration of the drug to normal human volunteers. From preliminary chemical, ultraviolet, and infrared spectral studies, it is concluded that: (1) the metabolite is a highly polar molecule; (2) it possesses a carboxyl function and a weakly acidic ionizable group; and (3) it is not a conjugate of glycine or glucuronic acid, and it is not an oxime. The spectral behavior of the metabolite when compared with known pyridine derivatives suggests that it is a derivative of N-methyl picolinic acid. (Author)

AD-267 332 Div. 16
(TISTB/LH) OTS price $2.60

Womack General Hospital, Fort Bragg, N. C.
FEASIBILITY OF CONTACT LENSES DURING AIRBORNE OPERATIONS.
Final rept., 1 Sep 60-28 Apr 61,
by Milton Braveman and John H. Rockwell.
28 Apr 61, 20p. incl. tables.
(Proj. no. 6x97-87-001)
Unclassified report

DESCRIPTORS: (*Contact lenses, Personnel, Airborne, Air force operations.) (Eye, Physiology, Vision, Visual acuity, Visual perception, Effectiveness.)

A feasibility study was made to determine whether personnel engaged in airborne operations are more visually efficient with contact lenses than with conventional spectacles. The project was subdivided into three phases: (1) preparatory phase for selection of subjects; (2) Clinical phase for examination, ordering, and dispensing contact lenses, and progress checks; and (3) evaluation phase in which findings obtained during the previous phases were compared. It was found that paratroopers who wear contact lenses while jumping possess better visual acuity and lessen the risk of breaking or losing their lenses than they did before they had contact lenses. Dusty environments preclude the use of contact lenses because of the danger of foreign bodies. (Author)

AD-267 447 Div. 16
(TISTB/CW) OTS price $1.60

Delft U. (Netherlands).
STUDIES ON THE EFFECT OF ULTRAVIOLET LIGHT ON CERTAIN CONSTITUENTS OF NUCLEIC ACIDS AND RELATED SUBJECTS (ENERGY TRANSFER IN AQUEOUS SOLUTIONS).
Final technical rept., 1 Nov 60-1 Nov 61,
by W. Berends. 1 Nov 61, 13p. incl. illus. tables, 18 refs.
(Contract DA 91-591-EUC-1595)
Unclassified report

DESCRIPTORS: (*Nucleic acids, *Ultraviolet radiation, Radiation effects.) (*Pyrimidines, Photochemistry, Chemical reactions, Decomposition, Water in Solutions.)

The dimerization of thymine in DNA and in a rapidly frozen aqueous solution as a result of UV-irradiation has been confirmed by a great many research workers. The remarkable effect of neutral compounds on the amount of the dimerization in DNA has been investigated in more detail. The conclusions are in agreement with our hypothesis about the important effect of ordered water molecules around the nucleic acids. Orotic acid, another pyrimidine derivative, appears to show also a dimerization-reaction if an aqueous solution of this compound is irradiated by UV-light. This photochemical conversion occurs even in non-frozen aqueous solution. The irradiation product was isolated and purified. According to a rontgenographic investigation the di-orotic acid contains crystal water. In the work on the energy transfer we have found the first examples of an energy transfer in aqueous solution. All available evidence points to triplet-triplet transfer. (Author)

AD-267 588 Div. 16
(TISTB/MS) OTS price $1.60

Giessen U. (Germany).
ADVANCED INVESTIGATIONS ON THE REQUIREMENTS OF VITAMIN B1 IN DIFFERENT DIETS.
Final technical rept., 1 Oct 59-28 Feb 61,
by H. D. Cremer. 28 Feb 61, 19p. incl. illus. tables.
(Contract DA 91-591-EUC-1293)
Unclassified report

DESCRIPTORS: (*Vitamins in *Thiamine, *Diet, Chemical analysis, Test methods, Chromatographic analysis, Laboratory animals.)

A paper chromatographical method for the determination of thiamine was proven for its application and usefulness for serial analysis. The method has the advantage of separating thiamine quantitatively from all other fluorescent accompanying substances. By modification, the time of evaluation was greatly reduced. For this reason, however, the sensitiveness formerly being in a range of 0.1 to 1.0 microgram thiochrome, became smaller, the minute measurable limit being now 0.2 microgram. This disadvantage can be compensated by a more thorough concentration of the samples before analysis or by the application of greater volumes to the chromatographic paper. (Author)

AD-267 601 Div. 16
(TISTB/CW) OTS price $1.10

Duke U. School of Medicine, Durham, N. C.
STUDIES ON THE NATURE OF THE METABOLIC RESPONSE TO INJURY.
Annual progress rept. 1 Apr-1 Nov 61,
by Frank L. Engel. 1 Nov 61, 7p. 13 refs.
(Contract DA 49-193-md-2153)
Unclassified report

DESCRIPTORS: (*Adrenal glands, *Tissues (Biology), *ACTH, Corticosteriods, Growth substances, Pharmacology.) (*Peptides, *Amino acids, Biochemistry, *Metabolism, Injuries.)

Studies of adrenal and extra-adrenal actions of three modifications of ACTH involving only the N-terminal serine indicate that an intact serine is necessary for maximal in vitro action of ACTH on the adrenal cortex but not for extra-adrenal action on adipose tissue in vitro or on adrenal cortex in vitro. A free terminal alpha-amino N is necessary for the latter activities, whereas both an alpha-amino N and a beta-OH are required for in vivo action on the adrenal cortex. Using various synthetic peptides related to ACTH it was found that the minimal chain length for action of adipose tissue is the same as for action on the adrenal cortex, e.g. between 13 and 18 amino acid residues. An extra-adrenal diabetogenic effect of ACTH in cortisone maintained adrenalectomized rats was demonstrated. Factors involved in peroxidation of unsaturated fatty acids during incubation of adipose tissue in vitro have been studied in depth. The role of the pituitary and of its hormones in the concentration of alphaamino isobutyric acid C(14) and unlabeled proline and alanine by rate diaphragm has been investigated. Growth hormone has a specific effect on AIB transport, shared to only a slight degree by prolactin. (Author)

AD-267 636 Div. 16
(TISTB/LH) OTS price $1.60

Mississippi U. School of Medicine, Jackson.
PHARMACOLOGICAL STUDY ON CENTRAL SYNAPTIC SYSTEMS AFFECTING MOTOR FUNCTION.
Semi-annual progress rept. 1 Apr-1 Sep 61,
by Samuel D. Anderson and William C. Holland.
1 Sep 61, 6p. illus.
(Contract DA 18-108-405-cml-749)
Unclassified report

DESCRIPTORS: (*Muscle relaxants, Neuromuscular transmission, Pharmacology, Dosage, Laboratory animals.)

Muscle relaxant properties and effects on the central nervous system (respiration-pupillary reaction, etc) were studied. Results indicated that compound 7607 will produce 50% depression of contractile tension. The average dose required to produce 50% depression of contractile tension varies moderately. This general class of agents, besides having effects on the polysynaptic reflex of the cord, has effects on higher brain centers. These compounds affect respiration, pupil size, sensitivity to pain and temperament. (Author)

AD-267 714 Div. 16
(TISTB/CW) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
BIOLOGY AND SPACE,
by V. Parin. 21 Nov 61, 5p. (Trans. no. FTD-TT-61-168 of Izvestiya, pp. 6, 28 Mar 61)
Unclassified report

DESCRIPTORS: (*Space medicine, Space flight, Manned, *USSR, *Translations, Technological intelligence.)

AD-267 794 Div. 16
(TISTB/CW) OTS price $1.10

Harvard U., Cambridge, Mass.
THE ATTRACTIVE FORCES BETWEEN MACROMOLECULAR CHAINS OF BIOLOGICAL IMPORTANCE,
by L. Salem. 1961, 6p.
(Sponsored by the Office of Naval Research)
Unclassified report

DESCRIPTORS: (*Biophysics, Molecular structure in *Biology, Theory.)

AD-267 797 Div. 16
(TISTB/CW) OTS price $1.10

Harvard U. Medical School, Boston, Mass.
KIDNEY FUNCTION: DIODRAST-I(131) CONCENTRATION WITHIN TUBULAR CELLS; EFFECTS OF INHIBITORS, COLD AND DIURESIS.
Final rept., 15 June 55-31 Aug 61,
by Eugene M. Landis and William B. Kinter.
31 Aug 61, 4p.
(Contract DA 49-007-md-624)
Unclassified report

DESCRIPTORS: (*Kidneys, Cells (Biology), Physiology.) (*Diodrast, Excretion, Labeled substances, Radioactive isotopes, Iodine, Distribution, *Autoradiography.)

During the first phase, the project's initial aims were fully achieved in the form of a combined autoradiographic and renal clearance study of Diodrast-I(131) transport in Necturus kidney. The quantitative autoradiographic approach was most productive of new information concerning tubular transport of this compound. In addition, the choice of Necturus as experimental animal was particularly rewarding since this species was discovered to exhibit a hitherto unknown feature, simultaneous bidirectional transport of Diodrast-like compounds across proximal tubular cells. The study on Necturus kidney is reviewed. The second and final phase consisted of a study of Diodrast-I(131) run-out from goldfish kidney in vitro. This study was designed to extend the observations first made in Necturus and proved to be equally productive of new information. The concept of exchange diffusion, recently developed by workers in other transport fields, was for the first time implicated in tubular cell transport of Diodrast and related compounds. This finding opens a whole new approach to understanding the fundamental mechanisms underlying such transport. The study on goldfish kidney is reviewed. (Author)

AD-267 800 Div. 16
(TISTB/CW) OTS price $3.60

Indiana U., Bloomington.
OPERANT CONDITIONING OF THE HEART RATE,
by Donald W. Shearn. Feb 61, 36p. incl. illus. tables, 29 refs. (Technical rept. no. 3)
(Contract Nonr-90815)
Unclassified report

DESCRIPTORS: (*Heart, Physiology, *Cardiotachometers, Conditioned reflex, Emotions.)

Operant conditioning of heart rate was demonstrated by making shock avoidance contingent upon the temporary accelerations heart rate of human Ss. Shocks were avoided for 20-sec. for some Ss, and 60-sec. for others, when adequate increases in heart rate accelerations were emitted, according to a Sidman-type schedule. Each operant S had paired with him a yoked control S whose sequence of shocks and shock avoidances was established by the responding of the operant S. Across the five sessions of the experiment the number of temporary heart rate accelerations rose for the operant Ss and fell for their yoked controls. Both operant and control Ss on the 20-sec. shock avoidance schedule gave many more temporary acceleration heart rate than S on the 60-sec. schedule, although the 60-sec. Ss showed a greater tendency to gain or lose these responses across sessions Mean over-all heart rate, while little effected by the difference between the operant and yoked control treatments, was greatly effected by the 20-sec. and 60-sec. shock avoidance schedules, especially within experimental sessions. A much greater decrement in over-all heart rate was observed for the 20-sec. condition. Significant changes in respiration were shown to accompany the heart rate increase responses. The problem of the effects of respiration upon heart rate was discussed within the present methodological framework. (Author)

AD-267 801 Div. 16, 28
(TISTB/CW) OTS price $1.60

Indiana U., Bloomington.
SKELETAL AND CARDIAC REACTIONS TO REINFORCING AND INCIDENTAL STIMULI,
by D. W. Shearn and R. C. Davis. 1961, 16p. incl. illus. 12 refs. (Technical rept. no. 4)
(Contract Nonr-90815)
Unclassified report

DESCRIPTORS: (Conditioned reflex, *Muscles, *Heart, Stimulation, Cardiotachometers, Reaction (Psychology).)

Reinforcing stimuli were differentiated from incidental stimuli by means of somatic reactions elicited by them in a single choice Humphreys guessing situation. Differentiation on the basis of skeletal musculature of the forearms was seen as small but reliable increases in muscle tension upon presentation of reinforcing stimuli and a reduction of muscle tension upon the presentation of incidental stimuli. The predominant response in heart rate is a slowing for the reinforcement stimuli, and an acceleration for the incidental. (Author)

AD-267 828 Div. 16
(TISTB/CW) OTS price $1.60

School of Aerospace Medicine, Brooks Air Force Base, Tex.
IN VIVO SPECIFIC ACTIVITY STUDIES OF IRON-CONTAINING FRACTIONS OF NORMAL RAT BLOOD,
by Thomas P. Leffingwell, George S. Melville, Jr., and Robert W. Riess. Aug 61, 12p. incl. illus. 18 refs. (Rept. no. 61-34)
Unclassified report

DESCRIPTORS: (*Iron in *Blood, Determination, Metabolism, Radioactive isotopes, Spectrophotometers.)

Determinations of stable iron and radioiron were made on cells, intact serum, and serum fractions of normal rats. Appreciable amounts of iron were found in at least one serum fraction other than that normally reported--that is, transferrin iron, or the Fe-beta-1-globulin complex. This iron was evidenced both spectrophotometrically and radiometrically. The radiometric assessments were effected through 192 hours after injection with radioiron. Radioiron exists in measurable quantities in the cells, in the transferrin form, and in another serum subfraction throughout this interval. On the basis of a purely empiric approach, and when the data are expressed as the specific activities of the iron in the various fractions of whole blood, certain kinetic-type functions would appear to exist. The apparent functions are replicable and, in more recent studies, were successfully extrapolated with an unexpected amount of accuracy. (Author)

Division 16 MEDICAL SCIENCES

AD-267 829 Div. 16
(TISTB/CW) OTS price $1.10

School of Aerospace Medicine, Brooks Air Force Base, Tex.
PARATUBERCULOSIS (JOHNE'S DISEASE) IN THE MONKEY (MACACA MULATTA),
by James A. Pitcock and Donald B. Gisler.
July 61, 5p. incl. illus. table (Rept. no. 61-86)
Unclassified report

DESCRIPTORS: (*Primates, *Tuberculosis, Epidemiology.)

Johne's disease or paratuberculosis is caused by the acid-fast organism Mycobacterium paratuberculosis and is known to affect cattle, sheep and goats. It has a prolonged course characterized by diarrhea, emaciation, and eventually death. The recognition of paratuberculosis in the monkey provides another specific cause of simian enteric disease which should be considered when the general problem of diarrhea and dysentery in the monkey are considered. Estimates of incidence vary from 2.5 to 25 percent, depending on the criteria used. The disease is more readily demonstrable and perhaps more important in older monkeys, but the prolonged natural course of the disease suggests that it may well be contracted at an early age. (Author)

AD-267 871 Div. 16, 3
(TISTM/TCG) OTS price $8.10

Johns Hopkins U., Baltimore, Md.
CHEMISTRY AND MECHANISM OF TOXIC ACTION OF SELECTED ALLERGENIC MATERIALS AND TOXIC PROTEINS.
Final comprehensive rept. 1 Nov 60-31 Oct 61,
by Alsoph H. Corwin. 31 Oct 61, 79p. incl. illus. tables.
(Grant no. DA-cml-18-108-61-G-15)
Unclassified report

DESCRIPTORS: (*Allergy, *Toxicity of *Proteins, Chemistry, Preparation, Test methods.) (Nervous system, Exposure, Cold baths, Sinusitis, Temperature, Metabolism, Blood pressure.) (Impurities in Glucose.) (Histamines, Oxygen, Acids.) (Ricin, Serum, Tests.)

An improved assay for the house dust allergen preparations utilizing dialysis and freeze drying to obtain dry weight and a modified Conway micro-Kjeldahl procedure are reported. The most effective means obtained for the promotion of spore growth was the addition of 0.0001% powdered Zn metal to the culture medium. Dialysis improved the purity of the product by a factor of about 16. The cement which binds the spores with ether decrease the hazard of handling and increased the yield ten-fold. The effect of structure of the amino acids present in the allergen was negligible. Test results are given for investigations on allergy and autonomic nervous system, urinary mucoproteins and allergy, impurities in glucose, histamine assay, the mechanism of action of ricin, and mucoprotein in serum.

AD-267 903 Div. 16, 25
(TISTM/GEC) OTS price $2.60

Harvard U., Cambridge, Mass.
THE FAR ULTRAVIOLET ABSORPTION SPECTRA OF POLYPEPTIDE AND PROTEIN SOLUTIONS AND THEIR DEPENDENCE ON CONFORMATION,
by K. Rosenheck and P. Doty. 1961, 18p. illus. 26 refs.
(Contract N5ori-07654)
Unclassified report

DESCRIPTORS: (*Peptides, *Protein solutions, Absorption, Ultraviolet, Spectrophotometers, Infrared spectroscopy, *Ultraviolet spectroscopy.) (Amino acids, Cysteine, Histidine, Amides, Arginine, Tryptophane, Phenylalanine, Methionine, Tyrosine, Lysines, Carboxylic acids.) (Myoglobin, Insulin, Ribonuclease, Myosin.)

The absorption spectra of polypeptides and proteins in aqueous solution in the region 185-240 millimicron were investigated and various factors contributing to this absorption were analysed. In polypeptides in the alpha-helical form a large hypochromic effect is observed as well as a new feature in the form of a shoulder at 205 millimicron, which is not present in the spectrum of the random coil conformation. The absorption spectrum associated with the beta-form was recorded, and is shown to differ from each of the other two. The hypochromic effect is also observed in proteins, and by applying a correction for the absorption of chromophoric side chains, it is possible to arrive at a value for the helical content of the protein, which agrees moderately well with data derived from optical rotatory dispersion measurements. (Author)

AD-267 908 Div. 16
(TISTB/CW) OTS price $1.60

Naval Radiological Defense Lab., San Francisco, Calif.
ACCELERATED INDUCTION OF NEOPLASMS IN MOUSE KIDNEYS X-IRRADIATED (690 r) WHILE UNDERGOING COMPENSATORY HYPERPLASIA,
by V. J. Rosen and L. J. Cole. 11 Oct 61, 15p. incl. illus. table, 14 refs. (Rept. no. USNRDL-TR-532)
Unclassified report

DESCRIPTORS: (*Kidneys, *Tumors, Production by X-rays, Radiation effects, Laboratory animals.)

Groups of young adult (C57LxA)F1 mice were subjected to several different treatments: (a) 690 rad whole-body X-irradiation; (b) unilateral nephrectomy and no irradiation; (c) 690 rad irradiation followed by unilateral nephrectomy 1 hr later; (d) unilateral nephrectomy followed by 690 rad irradiation 3 hr later; and (e) unilateral nephrectomy, 690 rad 3 hr later. The mice were examined 1 yr later for kidney neoplasms. The group nephrectomized and irradiated 3 hr later showed a high incidence (5 out of 11) of kidney adenomas, as compared with none in the mice irradiated only, or nephrectomized only. In addition, a high incidence (6 out of 10) of tubular or capsular renal proliferations was observed in the mice subjected to irradiation first and nephrectomy 1 hr later. These proliferations are considered to be early stages in the evaluation of the frank renal adenoma. Since the accelerated induction of kidney neoplasms observed, occurred under conditions which inhibit mitotic activity and compensatory hypertrophy in the mouse kidney, it was proposed that the development of these renal neoplasms was the consequence of a prolonged imbalance between the stimulus to mitosis or regeneration on the one hand, and the capacity for mitosis or regeneration, on the other. (Author)

AD-267 926 Div. 16
(TISTB/LH) OTS price $1.60

Science and Tech. Branch, Aerospace Information Div., Washington, D. C.
SOVIET LITERATURE ON LIFE SUPPORT SYSTEMS.
Monthly rept. no. 6 for Sep 61.
27 Oct 61, 16p. incl. illus. tables (AID rept. no. 61-143)
Unclassified report

DESCRIPTORS: (*Space medicine, *Closed cycle ecological systems, Space flight, Psychology, Physiology, Biology, Radiobiology, Metabolism, Instrumentation, *USSR.)

Partial contents:
Mechanism of decrease of blood properdin level in acute radiation sickness
Characteristics of course of acute radiation sickness in young rats
Strychnine for prevention of radiation sickness in radiation therapy
Effect of total-body irradiation with X-rays on the level of gamma-aminobutyric acid in brain
Chloride content of blood of rhesus monkeys after irradiation
Electrocardiographic changes in rabbits with acute radiation sickness induced by 255 Mev betatron rays
Prophylactic use of cysteinamine and cystamine in acute radiation sickness
Role of the properdin system as a nonspecific factor of organism's resistance to effect of ionizing radiation
Condition of hemato-encephalitic and other histohematic barriers in progeny of animals surviving acute radiation sickness

AD-268 002 Div. 16
(TISTB/LH) OTS price $2.60

Smith, E. H., and Co., Silver Spring, Md.
(No title)
Progress rept.
1956, 23p. incl. illus. tables.
(Contract DA 49-007-md-504)
Unclassified report

DESCRIPTORS: (*Radiation effects, Radiation injuries, Laboratory animals, Dose rate.) (Spleen, Shielding, Experimental data.) Bibliography.

Work has been concentrated on a study of partial-body irradiation experiments. A list of papers studied is given. A brief discussion is given of the difficulties encountered in partial-body irradiation experiments and in the analysis of these experiments. Experiment B-1 of Appendix B gives Jacobson's original work on the effect of spleen shielding in mice. (Author)

AD-268 008 Div. 16
(TISTB/MS) OTS price $1.10

Washington U., Seattle.
INTERRELATIONSHIPS IN ENRICHMENT CULTURE OF AQUATIC AND MARINE BACTERIA.
Final rept.,
by Erling J. Ordal and F. E. Palmer. 1 Dec 61, 10p.
(Contract Nonr-47726, Proj. NR 103-487)
Unclassified report

DESCRIPTORS: (*Bacteria, *Marine biology, *Microorganisms, Growth, *Nutrition, *Culture media, Test equipment, Test methods.)

The objectives of this research have been (1) to develop methods for the investigation in the laboratory of factors which control the rise and fall of populations of particular aquatic and marine microorganisms (2) to study effects of specific nutritive and environmental factors on the microbial flora in open systems which simulate the stream or ocean and, (3) to study the interrelationships between the organisms which develop in these steady-state enrichment cultures. Earlier it was found that when sea water was passed continuously over a bed of decomposing algae and fed into a culture chamber, prolific growth of large colorless sulfur bacteria ensued. All attempts to grow these bacteria on conventional liquid and solid media were unsuccessful. In this steady-state enrichment culture hydrogen sulfide, generated by reduction of sulfate from sea water, is continuously provided at low concentrations, thereby providing an energy source for colorless sulfur bacteria. Sphaerotilus was cultured in a set of six stainless steel vessels and the effects of certain variables noted. Good growth is obtained in a medium consisting of glucose and mineral salts, with ammonia as the nitrogen source and tap water as the diluent. (Author)

AD-268 093 Div. 16
(TISTB/MS) OTS price $1.50

Florida U., Gainesville.
HUMIDITY AND TEMPERATURE REQUIREMENTS OF SELECTED FUNGI.
Rept. for 1 Apr 59-31 Aug 60, on Health Hazards of Materials and Radiation,
by Seymour S. Block, Ralph Rodriguez-Torrent and Margaret B. Cole. Oct 61, 47p. incl. illus. tables.
(Contract AF 33(616)6387, Proj. 7165)
(ASD TR 61-490) Unclassified report

DESCRIPTORS: (*Fungi, *Spores, Viability, Humidity, Temperature, Tests, Growth, Inhibition, Deterioration.)

This research was conducted to investigated the viability of spores of selected fungi at various combinations of relative humidity between 60 and 95% and temperatures between 50 and 100 F. The microorganisms were selected because they were known to be a cause of, or associated with, fungal deterioration of Air Force materiel. Spore germination was usually prevented when the relative humidity was below 70% regardless of temperature. Reducing the temperature at R.H. values below 85% may retard spore germination and growth slightly. Above 90% R.H., any reduction in temperature has very little effect on spore germination. (Author)

17. METALLURGY

AD-267 101 Div. 17
(TISTM/EJH) OTS price $2.60

Southern Research Inst., Birmingham, Ala.
AN INVESTIGATION OF THE CRACK-PROPAGATION RESISTANCE OF HIGH-STRENGTH ALLOYS AND HEAT-RESISTANT ALLOYS.
Bimonthly progress rept. no. 5, 23 Aug-23 Oct 61,
by W. R. Salzman and J. D. Morrison. 23 Nov 61,

21p. incl. illus. tables (Rept. no. 6211-1256-V)
(Contract NOw 61-0392-d)
Unclassified report

DESCRIPTORS: (*Heat resistant alloys, *Steel, *Nickel alloys, Chromium alloys, Cobalt alloys, Sheets.) (Refractory materials, Brittle materials.) (Mechanical properties, Tensile properties, *Fracture (Mechanics), Transition temperatures, High temperature research, Deformation, Aging.)

Crack-propagation data are given for aged Rene' 41 sheet at various temperatures. The net fracture stress was higher than the yield strength at all temperatures except for a small temperature range around 1500 F. Data are given from a study of the effect of strain rate on the tensile-strength maximum associated with strain aging in tempered AISI 4130 sheet steel. The maximum shifted to higher temperatures and decreased with increasing strain rate. A decrease in the net fracture stress was found at approximately the same temperatures (200 to 400 F) as the strain aging peak. (Author)

AD-267 116 Div. 17, 25
(TISTM/GEC) OTS price $3.60

Martin Co., Baltimore, Md.
ERDL-NPFO (PROGRAM).
Quarterly progress rept. no. 16, Apr-June 61, by C. Eicheldinger. July 61, 28p. incl. illus. tables (Rept. no. MND-E-2014)
(Contract DA 44-009-eng-3581)
Unclassified report

DESCRIPTORS: (*Heat exchangers, Materials, Nickel alloys, Copper alloys or Cobalt alloys, Chromium alloys, Nickel, Steel, Stainless steel.) (*Corrosion, Corrosive liquids, Steam power plants.) (Tests, Test methods, Tensile properties, Heat transfer.)

The 2000-hour autoclave tests on nickel and inconel were completed. The nickel coupons exposed in the autoclave containing 1000 ppm chloride and 15 ppm oxygen suffered pitting corrosion. Maximum pit depth was 1.5 mils. Statistical analysis of the autoclave data was made. Operating time efficiency for the corrosion loop during the report period was 72%. Miniature heat exchangers, MIN 10, 11, 15 and 16 were re-ensured from the loop after 3000 hours of test time. They were replaced by MIN 13 and 14 (Monel) and 18 and 19 (nickel). Testing of the monel vessels, MOD SX-4 (bimetal) and SX-7 (inconel) continued. Post-test evaluation of MIN 10, 11, 15 and 16 was initiated. The inconel (10 and 11) vessels performed quite well with relatively little corrosion of the tubes. The bimetal (15 and 16) vessels suffered extensive corrosion of the carbon steel secondary surface of the tubing. (Author)

AD-267 273 Div. 17
(TISTM/GEC) OTS price $1.75

Defense Metals Information Center, Columbus, Ohio.
A SUMMARY OF THE THEORY OF FRACTURE IN METALS, by J. W. Spretnak. 7 Aug 61, 64p. incl. illus. tables, 51 refs. (DMIC rept. no. 157)
(In cooperation with Ohio State U., Columbus)
Unclassified report

DESCRIPTORS: (*Rocket cases, Solid rocket propellants, *Metals, Alloys, Solids, Lattices, *Crystals, Single crystals, Physical properties, Deformation, Plasticity, Shear stresses, *Fracture (Mechanics), Temperature, Thermodynamics, Theory.) (Copper, Aluminum, Zinc alloys, Aluminum alloys, Iron, Iron alloys, Silicon alloys, Chromium, Molybdenum, Zinc, Bismuth, Tellurium, Strontium compounds, Chlorides.)

The theoretical strength of metals, based on atomic forces, is in the order of 100 to 1000 greater than that observed. Reasons for this discrepancy are discussed in detail, but the more important ones are (1) lattice imperfections, (2) the fact that real metals are polycrystalline aggregates, (3) crystalline anisotropy, and (4) the ability of metals to deform by shear. Plastic flow, particularly heterogeneous plastic flow, is intimately associated with crack initiation. The precise conditions under which plastic flow ceases and bond rupturing (cracking) begins are not completely understood. The body-centered cubic lattice has geometric characteristics that make it particularly susceptible to fracture with little or no preceding plastic flow. Multidirectional stress fields, both microscopic and macroscopic, affect the degree of plastic deformation that precedes crack initiation. The theory of fracture as it exists today is reviewed. (Author)

AD-267 345 Div. 17
(TISTM/GEC) OTS price $1.10

Armour Research Foundation, Chicago, Ill.
INVESTIGATION OF HEAT TREATMENT AND WELDING CHARACTERISTICS OF B120 VCA TITANIUM ALLOY SHEET, PART II..
Quarterly rept. no. 3, 16 June-15 Sep 61, by John F. Rudy. 20 Oct 61, 8p. incl. illus. table (Rept. no. ARF-2211-3)
(Contract NOw 61-0351-c)
Unclassified report

DESCRIPTORS: (*Titanium alloys, *Sheets, *Welding, Heat treatments, Vibration, Magnetic fields, Aging.) (Welds, Mechanical properties, Tensile properties, Plasticity.) (Nucleation, Refractory materials, Tungsten compounds, Titanium compounds, Zirconium compounds, Carbides.)

The study of the heat treatment and weldability of B120 VCA titanium-base sheet alloy was continued. Work was directed primarily toward understanding the behavior of the weld metal; the mechanical properties, specifically the ductility, of the weld metal have been inferior to those of the base metal after high-strength-level heat treatments, with the fabrication procedures investigated. Optimum parameters for mechanical disturbance of the freezing weld puddle are being developed. Two methods of mechanical disturbance received attention: electromagnetic stirring and mechanical vibration. (Author)

AD-267 371 Div. 17
(TISTM/BRW) OTS price $8.10

Martin Co., Baltimore, Md.
AUTOCLAVE TESTING OF MONEL, NICKEL AND INCONEL, by J. McGrew, S. Frank, and T. Page. Oct 61, 75p. incl. illus. tables (Rept. no. MND-E-2655)
(Contract DA 44-009-eng-3581)
Unclassified report

DESCRIPTORS: (*Corrosion research, *Nickel, *Corrosion resistant alloys, *Nickel alloys, Copper alloys, Chromium alloys, Iron alloys.) (Test methods, Test equipment, Corrosive gases, Vapors, Corrosive liquids, Salts, Electrolytes, Oxygen, Stresses, Corrosion, Fracture (Mechanics).)

Stressed and unstressed specimens of Monel, Ni, and Inconel were exposed to varied environmental conditions to test their resistance to corrosion. Experiments were conducted in autoclaves operated at 450 F and 422 psia for 50, 200 and 2000 hours. Environmental conditions included variations in concentration of chloride, oxygen, phase (liquid or vapor) and method of pH adjustment. Statistical methods were employed in designing experiments and analyzing results. An incipient surface dulling was noted on some of the specimens that were tested for 50 and 200 hr, but none of the specimens cracked or pitted. No cracking of any coupons was observed in the 2000-hr autoclave tests, but varying degrees of pitting did occur for all 3 metals. Typical corrosion rates from the 2000-hr data for coupons exposed to 1000 ppm chloride and 15 ppm oxygen were: Monel, 0.50 mdd; nickel, 0.38 mdd; and Inconel, 0.02 mdd. Based on the test results, the materials are listed in order of preference as follows: Inconel, nickel, and Monel. (Author)

AD-267 386 Div. 17
(TISTP/MFA) OTS price $11.00

Union Carbide Metals Co., Niagara Falls, N. Y.
INVESTIGATION OF TUNGSTEN-TANTALUM-COLUMBIUM-BASE ALLOYS.
Report for 15 Mar-31 Dec 60, on Metallic Materials,
by Charles R. McKinsey, A. Leslie Mincher and others. July 61, 147p. incl. illus. tables, 54 refs.
(Contract AF 33(616)7225; Proj. no. 7351)
(ASD-TR-61-3) Unclassified report

DESCRIPTORS: (*Refractory materials, *Alloys of *Tungsten, *Tantalum, *Niobium.) (*High temperature research, Mechanical properties, Physical properties, Tensile properties, Stresses, Deformation.) (Structures, Mathematical analysis, Experimental data.) (Photographic analysis of Grains (Metallurgy), Transformations, Phase transitions.)

Two categories of properties pertaining to selected refractory alloy systems are presented. First, the alloys were screened as to their usefulness as high-temperature structural materials. Measurements of hot-hardness and oxidation resistance of arc-cast specimens delineated areas within the tungsten-tantalum-columbium ternary system combining high hardness at temperatures up to 2900 F. with improved oxidation resistance at 2190 F. The addition of tungsten and titanium improved the oxidation resistance of tantalum at 1830 and 2190 F., probably because of the formation of complex oxides in the outer scale. The second area concerned mechanical properties of tungsten or columbium at low and intermediate temperatures. The low-temperature yield properties of tungsten were studied, employing a compression test. Static strain-aging of tungsten at 400 to 600 C. was attributed to hydrogen. Dynamic strain-ading of columbium-oxygen alloys occurred at 300 to 400 C., while the addition of titanium, zirconium, and vanadium to columbium was found to shift the strain-aging region to 700 to 800 C. (Author)

AD-267 448 Div. 17, 26
(TISTM/REB) OTS price $9.10

Titanium Metals Corp. of America, Toronto, Ohio.
TITANIUM SHEET ROLLING PROGRAM FOR Ti-8Al-1Mo-1V, Ti-5Al-5Sn-5Zr, AND Ti-7Al-12Zr.
Bimonthly rept. no. 12, 1 May-30 June 61,
by D. L. Day, D. R. Mitchell, and H. D. Kessler.
14 Sep 61, 95p. incl. illus. tables.
(Contract NOa(s) 59-6227-c)
Unclassified report

DESCRIPTORS: (*Sheets, *Titanium alloys, Processing, Rolling mills, Heat treatment, Hydrogen, Hydrogenation, Mechanical properties, Tensile properties, Creep, Stability.) (Titanium alloys, Aluminum alloys, Molybdenum alloys, Vanadium alloys.) (Titanium alloys, Aluminum alloys, Tin alloys, Zirconium alloys.) (Titanium alloys, Aluminum alloys, Zirconium alloys.) (Processing, Contamination, Surface properties, Stresses, Corrosion.)

Twelve Ti-8Al-1Mo-1V sheets were duplex annealed at 1850F (5 min) AC + 1100F (8 hrs) and tested; the results were nearly the same as achieved in laboratory treated samples. The study of the effect of H on 1000F creep-stability and room-temperature notch properties of Ti-8Al-1Mo-1V showed that 150 ppm H content is a safe level in both mill annealed material. Uniform properties were found to exist through a representative sheet of Ti-8Al-1Mo-1V and a stress relieving investigation showed that temperatures of 1100-1300F are required to relieve residual stresses in short practical times. Laboratory studies on Ti-5Al-5Sn-5Zr and Ti-7Al-12Zr sheets showed that 0.010-0.012in should be removed from gage after finish rolling to remove processing contamination, particularly in Ti-7Al-12Zr; that 150 ppm H is a safe level for Ti-5Al-5Sn-5Zr; and 100 ppm appears to be tolerable in Ti-7Al-12Zr; and that slow cooling after final annealing adversely affects the creep resistance and ductility, especially the latter in Ti-7Al-12Zr. (Author)

AD-267 518 Div. 17, 2
(TISTP/MFA) OTS price $2.60

Metals Research Lab., Carnegie Inst. of Tech., Pittsburgh, Pa.
THE EFFECT OF TEMPERATURE ON DISLOCATIONS WITH CONDENSED IMPURITY ATMOSPHERES. THEORY OF DISLOCATION MOTION AND DISLOCATION BREAK-AWAY.
Technical rept.,
by Jens Lothe. 1961, 25p. illus.
(Contract Nonr-76008)
Unclassified report

DESCRIPTORS: (Crystal structure, *Metallic crystals, Deformation, Creep, Stresses, Mechanical properties, Temperatures, Thermal stresses.) (Physical properties, Lattices, Impurities.) (Energy, Equations, Partial differential equations, Statistical analysis.)

A simple model is used to exemplify the consequences of a statistical-mechanical treatment of condensed impurity atmospheres. As regards mechanical properties the all-important factor is the concentration of unoccupied impurity sites (holes) along the dislocation. The dislocations will tend to align themselves so that they accommodate impurities as efficiently as possible. Thus, the impurity interaction will lead to a sort of Peierls' barrier. Because the impurities line up the dislocations in valleys of maximum impurity interaction, on heating the dislocations will boil off the impurities in

one or several quite well defined peaks. Finally a qualitative discussion of how the effect of an intrinsic Peierls' barrier might be incorporated in the theory is given. (Author)

AD-267 525 Div. 17
(TISTM/REB) OTS price $1.25

Watertown Arsenal Labs., Mass.
TENSILE FRACTURE SURFACE CONFIGURATIONS OF A HEAT-TREATED STEEL AS AFFECTED BY TEMPERATURE.
Rept. on Research of Metals and Nonmetallic Materials for Ordnance Construction,
by Frank R. Larson and Frank L. Carr. July 61, 48p. incl. illus. tables, 18 refs. (Technical rept. no. WAL TR 320.1/5)
Unclassified report

DESCRIPTORS: (*Steel, Heat treatment, Surface properties, Surfaces, Microstructure, Fracture (Mechanics), Temperature.) (*Fracture (Mechanics), Analysis.) Mechanical properties.

Fractured surfaces of tensile specimens of SAE 4340 steel heat treated to various strength levels and microstructures were examined at a magnification of 20X. Measurements were made of the size of each of three types of fracture-appearance zones present on each specimen. These measurements were correlated with testing temperatures over the range of -196 to +200 C. Analysis of the quantitative amounts of 3 elements of fracture present, fibrous, radial shear, and shear-lip, resulted in a descriptive explanation of the initiation and propagation of the fracture. These various modes of fracture zones change their relative size with changing testing temperature, which results in a transitional fracturing behavior in tension similar to that observed in other types of testing. (Author)

AD-267 526 Div. 17, 26, 22
(TISTM/GEC) OTS price $3.60

Watertown Arsenal Labs., Mass.
METALLURGICAL EVALUATION OF ULTRAHIGH-STRENGTH VACUUM-MELTED AND AIR-MELTED STEEL TUBULAR EXTRUSIONS.
Rept. on Industrial Processing and Capabilities for High-Strength Titanium Tubes,
by Milton M. Mardirosian. Nov 61, 39p. incl. illus. tables (Technical rept. no. WAL TR 320.2/1)
Unclassified report

DESCRIPTORS: (Alloys, *Steel, Production, Processing, *Extrusion, Phase transitions, Melting, Tests, Test methods, Mechanical properties, Tensile properties, Heat treatment, Impact shock, Microstructure, Metallurgical analysis.) Military requirements, Recoilless rifles, Specifications.

An investigation was made to determine the metallurgical characteristics of 4 types of ultra-high-strength steel tubular extrusions for projected use in the Davy Crockett Weapons System. The extrusions consisted of two groupings, namely, air-melted and vacuum-melted, according to the melting practices utilized. Transverse mechanical property data and representative photomicrostructures are presented. Charpy V-notch impact resistance values were determined in the temperature range of -40 to +500 F. Tensile properties at maximum strain rate of 0.005 in./in./min were obtained during short-cycle elevated temperature tests in the range of 200 to 500 F. The data shows that type 4340 VAR (1.5Si modified), a vacuum-melted alloy, was the only type that met the minimum elevated temperature requirement of 175,000 psi yield strength at 0.10% offset in accordance with Military Specification MIL-S-46034A(ORD) dated 25 April 1960, while maintaining its high yield strength (200,000 psi minimum) at room temperature. (Author)

AD-267 552 Div. 17
(TISTM/GEC) OTS price $2.60

Southern Research Inst., Birmingham, Ala.
AN INVESTIGATION OF THE CRACK-PROPAGATION RESISTANCE OF HIGH-STRENGTH ALLOYS AND HEAT-RESISTANT ALLOYS.
Bimonthly progress rept. no. 4, 23 June-23 Aug 61,
by P. C. Jenkins and J. D. Morrison. 1 Sep 61, 18p. incl. illus. tables (Rept. no. 6095-1256-IV)
(Contract NOw 61-0392-d)
Unclassified report

DESCRIPTORS: (*Heat resistant alloys, Alloys, *Nickel alloys, Chromium alloys, High temperature research, Physical properties, Mechanical properties, Stresses, Tensile properties.) (Molybdenum, Molybdenum alloys, Titanium alloys, Physical properties, Mechanical properties.) Brittle materials, *Fracture (Mechanics).

Results are given of evaluations of tensile properties and crack-propagation properties of three nickel-base super alloys-Unitemp 1753, Inconel-X, and Nimonic 90. The alloys, in the aged condition, were evaluated over a range of temperatures representing the usual operating range of each alloy. There was some indication of brittleness, based on fracture appearance, for the Unitemp 1753 in the temperature range from 1400 to 1700 F. The other two super alloys, Inconel-X and Nimonic 90, showed brittleness, both by fracture appearance and lowered net fracture stress, at elevated temperatures, from 1000 to 1500 F for the Inconel-X and from 1200 to 1500 F for Nimonic 90. Chemical composition, processing details, and measurements of localized tensile ductility for three molybdenum sheet materials-unalloyed molybdenum, TZM alloy, and Mo-0.5% Ti alloy are reported. (Author)

AD-267 609 Div. 17
(TISTM/EJH) OTS price $2.60

Honeywell Research Center, Hopkins, Minn.
MAGNETIC REMANENCE IN DILUTE ALLOYS.
Final rept.,
by O. S. Lutes and J. L. Schmit. 25 Oct 61, 23p. incl. illus. tables, 14 refs.
(Contract Nonr-273200, Proj. NR-018-803)
Unclassified report

DESCRIPTORS: (*Magnetic materials, Alloys, *Copper alloys, *Manganese alloys and Gold alloys, Chromium alloys, Magnetic properties, Magnetic fields, Measurement, Temperature, Time, Low temperature research, Cryogenics, Theory.) *Magnetism.

A short summary is given of the method developed for measuring magnetization in a magnetically dilute alloy over the temperature range 0.6 - 40 K. This is followed by a presentation of detailed results obtained in the study of saturated magnetic remanence in dilute Cu(Mn) alloys. These results are analyzed in terms of

the temperature dependence of the remanence. An effective internal magnetic field is derived, and some conclusions are reached concerning the domain structure of the alloys. Qualitatively similar phenomena were found in a dilute Au(Cr) alloy. (Author)

AD-267 643 Div. 17, 26
(TISTM/REB) OTS price $1.10

New England Materials Lab., Inc., Medford, Mass.
HARD PARTICLE STRENGTHENING OF REFRACTORY METALS FOR HIGH TEMPERATURE USE THROUGH INTERNAL OXIDATION.
Progress rept. no. 5, 1 Sep-31 Oct 61,
by A. S. Bufferd, K. M. Zwilsky, and N. J. Grant.
30 Nov 61, 2p.
(Contract NOw 61-0316-c)
Unclassified report

DESCRIPTORS: (*Molybdenum alloys, Titanium alloys, Oxidation, *Dispersion hardening.) (*Refractory materials, Heat resistant alloys, Crystallization.)

Four alloy billets of internally oxidized Mo 1.5% Ti were prepared and hot upset to 94% of theoretical density. The structures and recrystallization behavior of previous alloys were investigated. (Author)

AD-267 689 Div. 17, 26
(TISTM/GEC) OTS price $1.60

Republic Steel Corp., Canton, Ohio.
EVALUATION OF THE PRODUCIBILITY OF TWO NEW TITANIUM BASE SHEET ALLOYS, Ti-7Al-12Zr AND Ti-5Al-5Zr-5Sn.
Bi-monthly rept. no. 10, 1 Sep-31 Oct 61,
by M. Scott and T. Vretas. 6 Nov 61,
12p. incl. tables.
(Contract NOa(s) 60-6035-c)
Unclassified report

DESCRIPTORS: (Alloys, Heat resistant alloys, *Titanium alloys, Aluminum alloys, Zirconium alloys, Tin alloys, *Sheets.) (Production, Processing, Heat treatment, Pickling, Rolling mills, Deformation.) (Tests, Mechanical properties, Tensile properties, Surface properties, Chemical analysis.)

Three hot rolled sheets 0.050 ga x 30 x 72 inches of Heat XT-70030 (Ti-5Al-5Zr-5Sn) were produced and mill processed almost to completion. Testing of these sheets was performed during mill processing as scheduled. Heat XT-70030 was analyzed to determine chemical composition and was found to be uniform, and within the nominal limits specified for the Ti-5Al-5Zr-5Sn alloy type. (Author)

AD-267 700 Div. 17, 25
(TISTM/GEC) OTS price $19.75

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STEROMETRIC METALLURGY, PART I (Stereometricheskaya Metallografiya),
by S. A. Saltykov, 6 Oct 61, 309p. incl. illus. tables (Trans. no. MCL-905, pt. 1/1+2 of Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Literatury Po Chernoy I Tavetnoy Metallurgii, Moskva, 444p., 1958)
Unclassified report

DESCRIPTORS: (Metals, Alloys, *Metallurgy, Determination, *Microstructure, *Microanalysis, Microphotography, Crystal structure, Surface properties, Phase studies, Molecular structure.) (Technological intelligence, Translations, USSR.)

The book presents the basic tenets of stereometric metallography, i.e. the combination of methods of quantitative evaluation of spatial microscopic structure of metals and alloys. Methods are described for estimating the most important parameters of spatial microstructure. It is demonstrated that the basic properties of metals and alloys and their behavior in the processes of hot and cold working are directly connected quantitatively with parameters of stereometric structure. (Author)

AD-267 701 Div. 17, 25
(TISTM/GEC) OTS price $18.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
STEROMETRIC METALLURGY, PART II,
by S. A. Saltykov. 6 Oct 61, 1v. incl. illus. tables, 277 refs. (Trans no. MCL-905, pt. 2 1+2)
Unclassified report

DESCRIPTORS: (Metals, Alloys, *Metallurgy, Determination, *Microstructure, *Microanalysis, Microphotography, Crystal structure, Surface properties.) (Technological intelligence, Translations, USSR.) (Grains (Metallurgy), Nucleation, Phase studies, Reaction kinetics, Mechanical properties, Deformation, Transformations, Physical properties.)

AD-267 707 Div. 17,
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ROLLING OF STAINLESS SHEET STEEL,
by P. I. Polukhin, N. M. Fedosov and others.
31 Oct 61, 4p. (Trans. no. MCL-1005 of Prokatnoye Proizvodstvo, pp. 762-765, 1960)
Unclassified report

DESCRIPTORS: (*Stainless steel, Austenite, Ferrites, Sheets, Production, Processing, Heat treatment, Plasticity, Hardness, Corrosion inhibition, Milling machines, Rolling mills, Machining.) (*USSR, *Translations, Technological intelligence.)

The use of cold-rolled stainless steel in various industries is indicated. During the cold rolling of stainless austenitic steel, thermal processing is applied by heating from 1100 to 1150 degrees with subsequent hardening in H20 or air. Fine plasticity and high anticorrosion properties are obtained. Methods for cold rolling rolls of hot-rolled stainless-sheet steel and the grinding and polishing techniques are discussed.

AD-267 740 Div. 17, 14, 4
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTROLYTIC PRODUCTION OF INDIUM-THALLIUM

SUPERCONDUCTING ALLOY COATINGS,
by S. I. Sklyarenko and I. I. Lavrov. 13 Nov 61, 9p. incl. illus. tables (Trans. no. FTD-TT-61-156 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Tsvetnaya Metallurgiya 4:139-144, 1961)
Unclassified report

DESCRIPTORS: (*Indium alloys, *Thallium alloys, Coatings, Superconductors, *Metal coatings on Copper, Cathodes (Electrolytic cell), Semiconducting films, Production, Electrodeposition.) (Electrolytes, Sulfamic acids, Electrodes, Electric potential, Polarization, Electrolysis.) *USSR, Translations, Technological intelligence.

A study was made to electrolytically produce a dense thin coating of In-Tl alloy on a Cu base with a Tl content of 10 to 20 wt-%. An alloy containing 15 wt-% Tl was obtained from a sulfamic acid bath containing 50 g sulfamic acid, 10 g In, and 0.5 g Th 2504/1. Quality deposits were obtained when the ratio of the In-Tl concentration in the electrolyte is 5-40; this corresponds to a Tl content in the alloy of 30 to 10 wt-%. The optimal temperature of the process is 50 degrees; increasing the temperature, decreases the Tl content of the alloy. The compact coatings obtained (8 to 40% Tl) showed stable superconducting properties at low temperatures, and anticorrosion properties in a high-humidity atmosphere and at elevated temperatures.

AD-267 791 Div. 17, 25
(TISTM/GEC) OTS price $5.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
INVESTIGATION OF THE STRUCTURAL AND MAGNETIC PROPERTIES OF THIN FERROMAGNETIC FILMS.
Rept. for May 59-July 60 on Applied Research in Electrical, Electronic and Magnetic Materials, by W. D. Doyle, J. Johnson and others. July 60, 50p. incl. illus. table, 23 refs.
(Contract AF 33(616)6298, Proj. 7371)
(WADD TR 60-787) Unclassified report

DESCRIPTORS: (*Thin films, Magnetic coatings, Metal coatings, Metal films, *Ferromagnetic materials, *Nickel alloys, *Iron alloys, Preparation, Design, Vacuum systems.) (Tests, Test methods, Magnetic properties, Surface properties, Structures, Spectrographic analysis, Electron microscopy, Electron diffraction analysis, Hysteresis, Magnetometers, Magneto-optic rotation, Torque.) Low pressure research.

The principle object of the research is the correlation of the magnetic and structural properties of thin ferromagnetic films. Described in detail are the instrumentation, the film preparation and the first results obtained with 77:23 permalloy films. The structural investigation was carried out by using electron microscopy and electron diffraction techniques. Replicas of the surface of the films indicated the presence of a roughness which, at present however, has not been correlated to the magnetic uniaxial anisotropy of the films. The magnetic experiments included the recording of hysteresis loops with an ac hysteresigraph, the observation of domain patterns in a Kerr Magneto-Optic apparatus and the measurement of the angular dependence of the torque with a sensitive torque magnetometer. The magnetic data are discussed in terms of the behavior of single domain and multi domain magnetic particles. (Author)

AD-267 864 Div. 17, 26
(TISTM/GEC) OTS price $6.60

David Taylor Model Basin, Washington, D. C.
THE EFFECTS OF AUSTENITIZING AND TEMPERING ON THE MECHANICAL PROPERTIES OF FULLY QUENCHED HY-80 STEELS,
by A. R. Willner and M. L. Salive. Nov 61, 65p. incl. illus. tables, 20 refs. (Rept. no. 1523)
Unclassified report

DESCRIPTORS: (*Steel, Heat treatment, Austenite, Transformations, Tests, Test methods, High temperature research, Mechanical properties, Tensile properties, Microstructure, Hardness, Hardenability.)

The effects of austenitizing, tempering temperatures times on fully quenched low- and high-chemistry HY-80 steels were investigated. Correlation procedures were established for relating notch-brittleness properties to tensile strength for a given Charpy V-notch fibrous fracture appearance. The results indicate that Charpy V-notch transition temperatures increase with increasing austenitizing and decreasing tempering temperatures. For fully quenched HY-80 steels, the optimum Charpy V-notch impact fibrous transition temperatures are attained for the 100,000-psi-yield-strength level. (Author)

AD-267 874 Div. 17
(TISTM/GEC) OTS price $1.60

Naval Research Lab., Washington, D. C.
ANOMALOUS FRACTURE IN THE CREEP OF NICKEL,
by T. C. Reuther, P. Shahinian and M. R. Achter. 1 Nov 61, 13p. incl. illus. tables (NRL rept. no. 5704)
Unclassified report

DESCRIPTORS: (Rods, *Nickel, *Nickel alloys, Chromium alloys, Tests, Test methods, Creep, *Fracture (Mechanics), Rupture, Oxidation, Surface properties.)

Ni and Ni-base alloys creep tested at relatively high temperature and low stress sometimes fail in the fillet where stress is appreciably less than in the gage section. This behavior is observed to occur in air, but never in vacuum. In the investigation of this anomaly, tapered nickel rods creep tested at 1200 and 1500 F fractured at the minimum diameter section in all vacuum and mildly oxidizing air tests. However, under strongly oxidizing conditions - long times in air at 1500 F - the fracture position was progressively displaced into heavier sections as the applied stress was reduced. Similarly, conventional specimens of different diameters creep tested at the same stress revealed that fracture may occur sooner in larger sections. Metallographic studies showed that under highly oxidizing creep conditions nickel is strengthened by the formation of load-bearing oxide which bridges intergranular cracks. The anomalous fractures are explained on the basis of the relative extent of oxide-filled and oxide-free cracks in small and large diameter sections of the specimens. (Author)

AD-267 891 Div. 17, 14
(TISTM/TCG) OTS price $5.60

Horizons, Inc., Cleveland, Ohio.
STUDIES OF THE REINFORCEMENT OF METALS WITH

ULTRA HIGH STRENGTH FIBERS (WHISKERS).
Final rept. 28 Oct 60-27 Aug 61,
by Bertram C. Raynes. 27 Nov 61, 48p. incl.
illus. tables.
(Contract NOw 61-0207-c)
Unclassified report

DESCRIPTORS: (*Metals, Single crystals, *Powder alloys, *Reinforcing materials, *Ceramic fibers, Fibers, Alloys, Powder metallurgy, Bonding, Binders, Soldering alloys, Stresses.) (Aluminum compounds, Oxides, Nickel alloys, Chromium alloys, Heat resistant alloys, Processing, Wetting agents, Chromium, Zirconium compounds, Hydrides, Magnesium compounds, Carbonates, Manganese compounds, Mechanical properties.) (Heat treatment, Sintering, Copper alloys, Zinc alloys, Boron alloys, Tensile properties, Elasticity, Wire, Sheets, Extrusion.)

The feasibility of reinforcing Nichrome or other high temperature alloys with high strength Al2O3 fibers (whiskers) was examined experimentally. The primary problems were the development of a strong bond between the metal matrix and the fibrous non-metallic reinforcing phases, and the development of a method to produce dense composites useful ultimately as structural shapes in which the reinforcing fibers are oriented with respect to stress. An extrusion process for producing such composites with oriented structures was developed. The process can be utilized in commercial practice at an anticipated reasonable cost for production of wire, sheet, bar, and uniform cross section of rod stock. Heat treatment in air of a composite containing excess Cr metal resulted in the most significant findings with respect to bond development and a survey. An Al2O3-Cr2O3 Nichrome bond producing useful strength was formed at least in part. (Author)

AD-267 920 Div. 17, 30
(TISTM/TCG) OTS price $8.10

Armour Research Foundation, Chicago, Ill.
A MECHANISM FOR STRESS-CORROSION EMBRITTLEMENT.
Final rept. 15 June 58-30 Sep 61.
27 Nov 61, 83p. incl. illus. tables, 21 refs.
(Rept. no. ARF 2152-18)
(Contract Nonr-260200)
Unclassified report

DESCRIPTORS: (Stainless steel, Magnesium alloys, Aluminum alloys, Copper alloys, Iron alloys, Metals, Alloys, Brittle materials, *Corrosion, Mechanical properties, *Fracture (Mechanics), Failure (Mechanics), Metallurgy, Electrochemistry.) (Tensile properties, Stresses, Deformation, Microstructure, Martensite, Austenite, Carbides.) (Test methods, Magnesium compounds, Chlorides, Air.)

The stress-corrosion cracking behavior of 304 stainless steel in MgCl2 at 140 C was studied. Tensile deformation behavior in the vicinity of the yield point suggested that there is no measurable Rebinder Effect or Roscoe Effect. In static tensile tests, the time to failure decreased with applied stress. No incubation period prior to the onset of cracking was noted; varying the time in solution prior to the application of stress had no effect on subsequent stress-induced failure. Prestressing in air in the range 140 to 500 C influenced subsequent time to failure at 140 C in MgCl2. Cyclic loading treatments had no influence on time to failure, and there was no evidence of rapid crack propagation characteristic of brittle fracture. Prior deformation reduced the susceptibility of 304 stainless steel. (Author)

AD-267 922 Div. 17
(TISTM/TCG) OTS price $1.10

Science and Tech. Branch, Aerospace Information Div., Washington, D. C.
SOVIET PRECIPITATION-HARDENABLE STAINLESS AND HIGH-STRENGTH STEELS.
27 Nov 61, 3p. (AID rept. 61-154; Trans. of New Products of Ferrous Metallurgy; Standartizatsiya, no. 10:46-51, Oct 61)
Unclassified report

DESCRIPTORS: (*Stainless steel, *Steel, Dispersion hardening, Tensile properties, Mechanical properties, Deformation, Heat treatment.) USSR, Translations, Specifications.

Technical specifications for 6 new precipitation-hardenable stainless and high-strength steels are given. (Author)

AD-267 939 Div. 17
(TISTM/TCG) OTS price $9.60

Climax Molybdenum Co. of Michigan, Detroit.
EXTRUSION AND MECHANICAL PROPERTIES OF SOME MOLYBDENUM- AND TUNGSTEN-BASE ALLOYS.
Rept. for Feb 60-Feb 61 on Metallic Materials, by M. Semchyshen and Robert Q. Barr. June 61, 107p. incl. illus. tables.
(Contract AF 33(616)6929, Proj. 7351)
(WADD TR 61-193) Unclassified report

DESCRIPTORS: (*Molybdenum alloys, *Tungsten alloys, *Refractory materials, Alloys, Tungsten, *Extrusion, Mechanical properties, High temperature research.) (Additives, Tantalum, Niobium.) (Tensile properties, Creep, Rupture, Fracture (Mechanics), Stresses, Crystallization, Microstructure, Hardness.)

Extrusion techniques were developed for several Mo base alloys, W-Mo binary alloys, and for unalloyed W. Extrusions were performed from 2000 to 3200 F, and at reduction ratios from 4:1 to 8:1. Al2O3-faced extrusion dies reduced the resistance to extrusion and improved the recovery of sound stock. The problems of die wash and poor bar surfaces associated with high-temperature extrusions through steel dies were circumvented by the ceramic facing. Extruded bars were converted to bar stock by rolling at 2400 F. The degree of success achieved in preparing bar stock from the extruded bars decreased as the amount of W in the alloy increased. Good high-temperature tensile and creep-rupture strengths were displayed by 3 alloys. (Author)

AD-267 985 Div. 17, 25
(TISTM/TCG) OTS price $1.25

New York U., N. Y.
INVESTIGATION OF CREEP BUCKLING OF COLUMNS AND PLATES. PART IV. COLUMN CREEP BUCKLING THEORY AND CORRELATION WITH EXPERIMENTS.
Rept. for Apr 60-Mar 61 on Materials Application, by George Gerard and Ralph Papirno. July 61, 33p. incl. illus.
(Contract AF 33(616)5807, Proj. 7381)
(WADC TR 59-416, pt. 4)
Unclassified report

DESCRIPTORS: (*Beams, *Sheets, *Creep, *Buckling, Equation of state, Stability, Elasticity, Theory.) (Aluminum alloys, Tests.)

A creep buckling theory is developed based upon fundamental concepts of a mechanical equation of state to represent the time dependent behavior at instability of columns and also a time dependent formulation of the governing differential equation and stability criterion. The predictions of this theory as well as those of other classical stability hypotheses are then correlated with recent experimental data of creep buckling of 2024-0 Al alloy columns. A simplified approach for prediction of creep buckling is also presented and this is correlated with test data on columns of various Al alloys, Ti alloys, and 17-7PH stainless steel. Conclusions are drawn as to the predictive value of classical stability approaches and to certain important difficulties in correlating the data which are related to the short time failure behavior of columns at elevated temperatures and which seem to have been overlooked in the past. (Author)

AD-268 017 Div. 17
(TISTM/REB) OTS price $1.00

Materials Research Corp., Yonkers, N. Y.
THE MECHANICAL PROPERTIES OF TANTALUM WITH SPECIAL REFERENCE TO THE DUCTILE-BRITTLE TRANSITION.
Rept. for 1 Apr 60-1 Apr 61 on Metallic Materials,
by M. A. Adams and A. Iannucci. Aug 61, 28p. incl. illus. tables, 22 refs.
(Contract AF 33(616)7173, Proj. 7351)
(ASD TR 61-203) Unclassified report

DESCRIPTORS: (*Tantalum, Transition temperature, Mechanical properties, Stresses, Tensile properties, Temperature, Microstructure, Fracture (Mechanics).) Refractory materials, Transition elements.

Tensile tests were made on specimens of commercial Ta of different grain-sizes, and the variation of lower yield stress with grain-size 2d was used to assess the effect of temperature (23, -78 and -196 C) and strain-rate (0.00109 and 0.0996 sec. at each temperature) on the parameters sigma sub i and k sub y in a Petch type equation. The results indicate that the sensitivity of the yield strength to temperature and strain-rate arises almost entirely from the effects that these variables produce on sigma sub i. The high resistance of Ta to brittleness has been confirmed, all of the specimens showing pronounced necking and predominantly fibrous fractures; on the fracture surfaces of the coarser grained specimens tested at -196 C (both strain rates) some cleavage facets were observed. The greater ductility of Ta relative to Nb, Mo, and mild steel is attributed to a low value of k sub y and a high value of shear modulus.

AD-268 039 Div. 17, 26
(TISTM/EJH) OTS price $2.60

Battelle Memorial Inst., Columbus, Ohio.
DEVELOPMENT OF A DUCTILE TUNGSTEN SHEET ALLOY.
Quarterly progress rept. no. 2, 26 July-26 Oct 61,
by J. L. Ratliff, G. S. Root and others.
26 Nov 61, 26p. incl. illus. tables.
(Contract NOw 61-0677-c)
Unclassified report

DESCRIPTORS: (Refractory materials, Heat resistant alloys, Tungsten, *Tungsten alloys, Powder alloys, Powder metallurgy, Melting, Transition temperatures, Hardness, Mechanical properties, Processing, Microstructure, Sheets, Production.) (Tungsten alloys, Thorium compounds, Oxides.) (Tungsten alloys, Zirconium compounds, Oxides.) (Tungsten alloys, Rhenium alloys or Iridium alloys.)

Binary alloys of W with thoria, zirconia, and the Groups VII and VIII metals are being evaluated to determine the effects of these additions on lowering the ductile-to-brittle transition temperature of W. Both powder-metallurgy and arc-melting techniques are being used in alloy preparation. The first series of W-ThO2 and W-ZrO2 alloys prepared by powder metallurgy from soluble salt additions were fabricated to supply strip for property studies. These alloys were tested for bend ductility in the stress-relieved condition. Minimum transition temperatures of 140 and 130 C were obtained at 4 vol-% ThO2 and ZrO2, respectively. The optimum solid-solution alloys of W with the Groups VII and VIII metals were prepared as 75-g button ingots. The softening effects previously observed in the 10-g buttons were reproduced in those alloys, W-5Re and W-0.3Ir, which did not present compositional control problems during melting. (Author)

AD-268 081 Div. 17, 26, 12
(TISTM/EJH) OTS price $5.60

Defense Metals Information Center, Columbus, Ohio.
MACHINING OF SUPERALLOYS AND REFRACTORY METALS,
by C. T. Olofson and F. W. Boulger. 27 Oct 61, 40p. illus. tables, 65 refs. (DMIC memo. no. 134)
Unclassified report

DESCRIPTORS: (*Refractory materials, *Heat resistant alloys, *Molybdenum, *Tungsten, *Niobium, *Tantalum, Molybdenum alloys, Nickel alloys, Cobalt alloys, Chromium alloys, Tantalum alloys, Niobium alloys, High temperature research, *Machining, Processing.) (*Machine tools, Milling machines, Cutting tools, Drilling machines.) Airframes, Bibliography.

Contents:
Machining superalloys
  General information
  Effect of alloy condition on machinability
  Minimizing work-hardening tendencies of superalloys
  Turning and facing operations
  Milling operations
  Drilling operations
Machining of refractory metals
  Tungsten
    Effect of surface contaminations on machinability
  Molybdenum
    Effect of anisotropy, grain structure and prior work on machinability
  Tantalum and columbium
    Turning operations, milling operations
Bibliography

AD-268 088 Div. 17
(TISTM/REB) OTS price $1.10

Electro-Optical Systems, Inc., Pasadena, Calif.
INVESTIGATION OF THE EFFECT OF ULTRA-RAPID QUENCHING OF METALLIC SYSTEMS, INCLUDING BERYLLIUM ALLOYS.
Monthly progress rept. no. 8 for Nov 61,

by C. B. Jordan. 15 Dec 61, 2p. (EOS rept. no. 1650-M-8)
(Contract AF 33(616)8011, Proj. 1(8-7351)
Unclassified report

DESCRIPTORS: (Alloys, *Beryllium alloys, Silicon alloys, Copper alloys, Nickel alloys, Phase studies, Cooling, X-ray diffraction analysis.)

The Be-Si system was examined in an effort to clarify the question as to whether any degree of solid solution is produced by splat cooling. Alloys of composition 40, 60, and 75 w/o Be were prepared and quenched. The X-ray patterns of these alloys, both before and after quenching, showed no significant changes of spacings from those for pure Si. It appears, therefore, that no change due to rapid quenching occurs in the Be-Si system. In the Be-Cu system, an additional composition (namely 40 w/o Be) representing the eutectic between Be and the delta phase was prepared and quenched. The reflections of Be and of the delta phase were identified on the X-ray patterns before and after quenching, and no shift in the spacings of either was found. Further effort was devoted to the problem of the Be21Ni5 pattern. (Author)

AD-268 092 Div. 17
(TISTM/REB) OTS price $1.60

Laboratories for Research and Development, Franklin Inst., Philadelphia, Pa.
PREPARATION AND EVALUATION OF HIGH PURITY BERYLLIUM.
Bi-monthly progress rept. no. 6, 2 Sep-1 Nov 61, by G. E. Spangler, M. Herman and others. 1 Nov 61, 10p. incl. illus. table (Rept. no. P-A2476-6)
(Contract NOw 61-0221-d)
Unclassified report

DESCRIPTORS: (*Beryllium, Purification, Zone melting, Single crystals, Metallic crystals, Tensile properties, Crystallization, Lattices, Deformation, Electron microscopy, Metals, Preparation, Crystal structure.)

The zone refining of one inch diameter Brush vacuum cast Be bar was continued, along with the zone refining of smaller diameter vacuum distilled and Pechiney SR grade bars. Three single crystal specimens of varying purity content were tested in tension. Vacuum distilled material which was subsequently zone melted seven passes exhibited a value of 400 psi for the critical resolved shear stress on the basal plane. Additional zone melted polycrystalline was prepared by hot rolling and recrystallizing four pass single crystal Be. Two different orientations with respect to the rolling plane were used. Tensile tests and bend tests were performed, but the results to date are inconclusive. Preliminary examinations have been made of zone refined Be by electron transmission microscopy. (Author)

18. MILITARY SCIENCES AND OPERATIONS

AD-267 131 Div. 18
(TISTB/MS) OTS price $3.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
PROJECT TE/AS. LIMITED WAR THREAT EVALUATION AND ACTION SELECTION 1970-1980,
by Myron L. Braunstein and Edwin W. Roth. Sep 61, 32p. incl. illus. tables (Rept. no. ZF-1447-G-6)
(Contract AF 19(604)7361)
(AFCRL-762) Unclassified report

DESCRIPTORS: (*Operations research, *Warfare, *War potential, Military operations, Military intelligence, Control systems.)

The development of basic techniques of decision making and their application to the threat evaluation - action selection function has broad implications to the entire area of command and control systems. Since the prime objective of command and control systems is to assist in decision making at various levels of application, and since the TE/AS function is central to the military operation, the techniques desired and the configuration formulated should form a basic framework upon which future command and control systems can be postulated. If there is to be a general theory of command and control, and if there are to be basic techniques, devices, and organizations of humans, data, and equipment, it is believed that programs of this nature can make significant contributions. The application of this body of fundamental knowledge to the development of a command and control system for specific applications within specific organizations having a specific mission should substantially increase the system effectiveness and operational life. (Author)

AD-267 434 Div. 18, 32
(TISTB/MS) OTS price $2.60

RAND Corp., Santa Monica, Calif.
MILITARY FORCE AND SOVIET GOALS,
by Herbert S. Dinerstein. 2 June 61, 23p. (Research memo. no. RM-2771)
(Contract AF 49(638)700, Proj. RAND)
Unclassified report

DESCRIPTORS: (*Military operations, *Political science, USSR, Communism.)

Methods whereby the Soviets use military power to further political ends are examined. The methods take three principal forms: (1) demonstrations of the existence of military power; (2) threats to use force under circumstances vaguely defined; and (3) the sale of conventional weapons is used to intimidate our NATO allies into considering exclusion of nuclear weapons from their territories. In this connnection, Berlin poses a dilemma for the Soviets: pressure on Berlin enhances the attractiveness of NATO protection, while relative passivity encourages resistance to Soviet demands. As for the sale of weapons, the purchaser could be expected to use them militarily or politically against a member of NATO, CENTO, or SEATO. Aid to emergent nations is considered to be a blow to Western imperialism and therefore a means of weakening capitalism and fostering socialism--and ultimately communism. This review of Soviet employment of power during the Cold War leads to the conclusion that nuclear weapons have not cancelled themselves out (as some claim). Even without war, it is plain that weapons of all kinds will continue to play an important role in international life. (Author)

AD-267 457 Div. 18, 23, 12
(TISTW/RD) OTS price $9.60

4750th Test Squadron (Tactics and Application Engineering) Tyndall Air Force Base, Fla.
CATEGORY III OF THE Q-2C DRONE TARGET SYSTEM DEVELOPMENT AND OPERATIONAL EVALUATION PROGRAM.
Final rept.
1 Aug 61, 111p. incl. illus. (Proj. ADC/73AD/559-13)
Unclassified report

DESCRIPTORS: (*Target drones, Maintenance, Launching by Jatos, Tests, Recovery, Reliability.) (Firing error indicators, Radar tracking, Remote control systems, Telemeter systems, Command systems, Radar beacons.) (Aviation personnel, Training.)

The Q-2C drone target system was developed to provide a high subsonic speed, realistic target for the evaluation and training of various weapon systems and aircrews. The Category III evaluation to determine operational suitability of the Q-2C was conducted in two phases during the period 15 July 1960 to 12 July 1961. Ten missions were flown in the airborne launch phase and twenty-five were flown in the ground launch phase. The production Q-2C drone target system is not operationally acceptable for ADC Weapons Center use. Deficiencies in X-Band augmentation, S-Band radar tracking, radio remote control, PARAMI scoring and airborne/ground telemetry link detract from the reliability and effectiveness necessary for Weapons Center utilization. It is recommended that all system deficiencies outlined in this report be resolved. (Author)

AD-267 564 Div. 18, 15, 33
(TISTP/MFA) OTS price $3.60

Army Transportation Research Command, Fort Eustis, Va.
A MILITARY TRUCK-TRANSPORT MODEL THEORETICAL DERIVATION OF GENERAL TIME-DEPENDENT TRANSFER EQUATIONS AND DENSITY FUNCTIONS.
Research rept. no. 1,
by Harvey J. Charlton and John H. Neblett.
Nov 61, 29p. incl. illus. (TCREC TR 61-137)
(Proj. 9R38-11-009-02)
Unclassified report

DESCRIPTORS: (Military transportation, Military equipment, *Cargo vehicles, *Logistics, Maps.) (Reliability, Terrain, Mobile, Time.) (Equations, Density, Functions, Geometry, Mathematical prediction.) *Transportation.

The transfer equations and the density equation are developed, the truck-transport model and the appropriate two speed transfer equations are developed, the steady state intensity equations and the time-dependent equations are derived. Included is a discussion of the density, mass absorption coefficient, and phase function used in the formulation of the equations. Also, the general operational significance of these quantities in ascertaining their mathematical importance and in indicating how these coefficients in practice are evaluated is included. The culminating equations are the time-dependent density equations. (Author)

AD-268 013 Div. 18
(TISTB/JAB) OTS price $3.60

Army Logistics Management Center, Fort Lee, Va.
BIBLIOGRAPHY OF LOGISTICS STUDIES AND RELATED DOCUMENTS.
Quarterly supplement no. 1 to annual rept. for 1961.
1 Oct 61, 31p. (Suppl. to AD-268 014)
Unclassified report

DESCRIPTORS: *Logistics, *Bibliography.

AD-268 014 Div. 18
(TISTB/JAB) OTS price $8.10

Army Logistic Management Center, Fort Lee, Va.
BIBLIOGRAPHY OF LOGISTICS STUDIES AND RELATED DOCUMENTS.
Annual rept. for 1961.
1 July 61, 281p.
Unclassified report

DESCRIPTORS: (*Logistics, *Bibliography.)

19. NAVIGATION

AD-267 244 Div. 19, 16
(TISTP/GRW) OTS price $8.10

Pennsylvania State U. Coll. of Chemistry and Physics, University Park.
BIRD NAVIGATION.
Final rept., 16 Mar 56-15 July 61,
by Henry L. Yeagley. 15 July 61, 84p. incl. illus. tables.
(Contract Nonr-65614, Proj. NR 301-327)
Unclassified report

DESCRIPTORS: (*Bird navigation, Theory, Birds, Pigeons, Flight paths.)

A report is presented on data taken with both wild fowl and Army homing pigeons trained at State College, Pennsylvania, with the object of seeking information on new mechanisms of bird navigation or to get data which will tend to support or refute existing theories. Another report is presented on data taken exclusively with wild fowl to find new leads regarding possible navigating mechanisms and indications of navigational or non-navigational tendencies with birds released in unfamiliar territory at great distances from the navigational training area. The design of the experiment involved taking the birds well away from their home areas and giving no special consideration to any known theory of bird navigation. (Author)

AD-267 582 Div. 19, 5, 28
(TISTB/LH) OTS price $23.50

General Dynamics/Pomona, Calif.
HUMAN FACTORS ANALYSIS OF VOICE COMMUNICATIONS PRACTICES IN AIR TRAFFIC CONTROL. VOLUME II. SUPPORTING DATA.
Final rept.,
by Malcolm Smith, Larry Kashdan and others.
June 60, 449p. incl. illus. tables (Rept. no.

TM 339-84)
(Contract FAA/BRD-44)
Unclassified report

DESCRIPTORS: (*Air traffic controllers, Human engineering, Statistical analysis.) (*Air traffic control systems, Communication equipment, *Voice communication systems, Intelligibility, Reliability.) (Ground controlled approach radar, Radio communication systems, Airport radar systems.) Operations research.

AD-267 703 Div. 19
(TISTA/VGW) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
NEWS OF THE INSTITUTES OF HIGHER LEARNING; INSTRUMENT MANUFACTURE (SELECTED ARTICLES).
21 Nov 61, 36p. incl. illus. table (Trans. no. FTD-TT-61-161 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Priborostroyeniye, No. 4:48-70, 1961)
Unclassified report

DESCRIPTORS: (*Gyroscopes, Moments, Dynamics, Impact shock, Mathematical analysis, Stability, Rotation.) (*Compasses, ViVibration, Cantilever beams, Tests.) (Gyroscopes, Design, Manufacturing methods.) (USSR, Technological intelligence, Translations.) Gyroscopes, *Electric motors, Aerodynamics, Moments, Drag, Rotation, Mathematical analysis.

Contents:
The center of impact of heavy gyroscopes
The influence of cantilever vibration on the reading of a two-stage gyro-compass
The calculation of the aerodynamic resistance of a gyro-motor

AD-268 000 Div. 19, 1, 5, 6
(TISIP/JP) OTS price $5.00
Armed Services Technical Information Agency, Arlington, Va.
AIR TRAFFIC CONTROL SYSTEMS: AN ASTIA REPORT BIBLIOGRAPHY.
Jan 62, 692 refs.
Unclassified report

DESCRIPTORS: *Air traffic control systems, *Air traffic controllers, Computers, Digital computers, Data processing systems, Communication systems, Display systems, *Ground controlled, Approach radar, *Instrument landings, *Instrument flight, Navigation, Radar beacons, Maintenance personnel, Human engineering, Simulation, *Bibliography, Conferences, Symposia.

This bibliography was prepared by ASTIA in response to frequent requests for information concerning Air Traffic Control Systems and related topics. An unclassified and classified section of the bibliography appear separately as AD-268 000 and AD-326 900 respectively. The classified section includes Confidential and Secret material. Entries are arranged in alphabetical sequence by subject areas. Within each area, and its sub-divisions, reports published by Department of Defense contractors are listed alphabetically by source and contract number, and then by date; military reports are arranged by source and title. This arrangement will permit the reader to readily identify the specific information required by subject and to follow the continuity of research completed by given activity.

20. NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

AD-267 149 Div. 20, 4
(TISTM/EJH) OTS price $1.00

American Oil Co., Whiting, Ind.
DOSE RATE EFFECTS IN LIQUID HYDROCARBON RADIOLYSIS.
Rept. for Feb 60-May 61 on The Chemistry and Physics of Materials,
by T. D. Nevitt and W. A. Wilson. June 61, 27p. incl. illus. tables, 23 refs.
(Contract AF 33(616)7089, Proj. 7360)
(ASD TR 61-169) Unclassified report

DESCRIPTORS: (Liquids, *Hydrocarbons, *Cyclohexanes, *Hexanes, *Pentanes, Radiation effects, Radiation damage, Gamma rays, Chemical reactions, Ionization, Reaction kinetics.) Test equipment, Test methods, Chromatographic analysis, Dosimeters.

The effects of extremely high dose rates on products of hydrocarbon radiolyses were examined. Cyclohexane, hexane, and pentane were irradiated at 2 x 10 to the 16th power, 5 x 10 to the 20th power and 5 x 10 to the 23rd power ev/g-sec. Radiation dose ranged from 10 to the 19th power to 10 to the 20th power ev/g. The products from cyclohexane: hydrogen, cyclohexene and dicyclohexyl did not change with dose rate. Experiments using cyclohexene for hydrogen scavenging or deuterium labeling gave no evidence for dose rate effects occurring in radiation spurs. Low molecular weight products from hexane change slightly with dose rate; C12 products from hexane and C10 products from pentane show small but definite dose rate dependence. At the high dose rates investigated, dose rate does not control product ratios. The results indicate a more marked dependence on dose rate might be found at doses lower than examined here. (Author)

AD-267 161 Div. 20, 32
(TISTB/CCH) OTS price $2.60

Radiation Effects Information Center, Columbus, Ohio.
MONTHLY ACCESSION LIST 52.
Rept. for 1-31 Oct 61.
15 Nov 61, 20p. (REIC Accession List no. 52)
(Contract AF 33(616)7375; continuation of Contract AF 33(616)6564, Proj. 1448)
Unclassified report

DESCRIPTORS: (*Bibliography, *Radiation effects.) Electronics, Space flight, Polymers, Organic compounds, Inorganic substances, Metals, Ceramic materials, Dosimeters.

AD-267 190 Div. 20, 25
(TISTP/MFA) OTS price $7.60

Michigan U. Coll. of Literature, Science, and the Arts, Ann Arbor.
ROTATIONAL ENERGIES OF ASYMMETRIC ODD-A NUCLEI AND NUCLEI WITH A AROUND 190,
by Karl T. Hecht and G. R. Satchler. Aug 61, 1v. incl. illus. tables, 14 refs.
(Contract Nonr-122415)
Unclassified report

DESCRIPTORS: (*Argon, *Isotopes, Nuclei, Energy, Nuclear spins, Nuclear magnetic moments, Nucleons, Particles.) (Excitation, Wave analysis, Electromagnetic waves, Harmonic oscillators, Matrix algebra, Quantum mechanics.) (Experimental data, Tables.)

The asymmetric rotator model of Davydov and Filippov (Nucl. Phys. 8:237, 1958) was extended to odd-A nuclei by coupling a single nucleon to an inert core of well stabilized asymmetric equilibrium shape. Rotational energies are calculated for states with spin I through numerical diagonalization of (I + 1/2) x (I + 1/2) rotational matrices which depend in a complicated way on the state of the odd nucleon. The state of the odd nucleon is described by single particle wave functions such as those calculated by Newton, generalizations for the asymmetric case of the wave functions computed by Nilsson for axially symmetric nuclei. The rotational energy spectrum for a particular particle excitation is in general very rich in number of levels and may consist of a complicated sequence of spin values. In many cases, particularly for small-asymmetries, the rotational spectra may consist of several well separated or overlapping sequences of spin states which resemble the rotational bands of axially symmetric nuclei, especially insofar as K may be approximatly a good quantum number for each sequence. (Author)

AD-267 241 Div. 20
(TISTP/MFA) OTS price $1.10

Ecole Normale Superieure (France).
SOME REMARKS ABOUT THE PHOTOPRODUCTION OF STRANGE PARTICLES,
by M. Gourdin. Feb 61, 7p. incl. illus.
(Technical note no. 25)
(Contract AF 61(052)173)
(AFOSR-1567) Unclassified report

DESCRIPTORS: (*Photonuclear reactions, *Particles, Nucleous, Mesons, Hyperous.) (*Nuclear magnetic resonance, Nuclear magnetic moments, Differential cross sections.)

An elementary description of strange particles photoproduction by adding to the Born terms some contributions due to resonances is presented. For Channel I (intermediate nuclears) and III (intermediate hyperons), the situation is exactly the same as for the associated production amplitude. For the Channel II (intermediate k-mesons) we have the possibility of an intermediate pi - K state. If we call K' the observed resonance, we replace the cut corresponding to the pi K intermediate state by a pole at the resonance energy. (Author)

AD-267 377 Div. 20, 15
(TISTP/MFA) OTS price $1.60

Nuclear Defense Lab., Army Chemical Center, Md.
METHOD OF EVALUATION OF EXPERIMENTAL RADIATION MEASUREMENTS OVER A RECTANGULAR SOURCE,
by John L. Meredith. Apr 61, 18p. incl. illus. tables (Rept. no. NDL-TR-11)
Unclassified report

DESCRIPTORS: (*Radioactive fall-out, Nuclear weapons, Analysis, *Radiological warfare, Decontamination.) (Detection, Military research, Military facilities, Radiation effects.) (*Statistical analysis, Probability, Computers, Numerical methods and procedures.) (Experimental data, Tables.)

A method of data analysis was derived for the evaluation of radiac instrument measurements over a rectangular test area which takes into consideration the size and shape of the test area, the location of the instrument, the distribution of the contaminant, and the instrument error.

AD-267 442 Div. 20
(TISTP/MFA) OTS price $12.00

Texas Instruments, Inc., Dallas.
A STUDY OF THERMOELECTRIC DIRECT-CONVERSION NUCLEAR REACTORS.
Summary rept., 1 Nov 60-31 Oct 61,
by R. A. Chapman, W. R. Clendinning and others.
Nov 61, 161p. incl. illus. tables.
(Contract Nonr-334400)
Unclassified report

DESCRIPTORS: (*Research reactors, Design, Analysis, Nuclear physics, *Thermoelectricity, Power reactors, *Electric power production.) (Nuclear resonance, Thermionic emission, Reactor fuels, Intermetallic compounds, Thermal stresses, Thermal conductivity.) (Mechanical properties, Tensile properties, Materials.) (Equations, Experimental data, Tables.)

For light-water moderated reactors using thermoelectric direct-conversion nuclear fuel elements, this study demonstrated that: (1) the reactor using PbTe can be made critical with less than 20% U235 enrichment; (2) a prompt negative temperature coefficient of reactivity must be present in the fuel for safe operation; (3) a cylindrical UO2-PbTe element will withstand operating thermal stresses if properly designed; (4) the element can be fabricated, but at considerable cost; (5) the thermal power density must be considerably reduced upon introduction of the thermoelectric between the fuel and coolant; and (6) the most promising thermal cycle is provided by natural circulation. These results do not rule out feasibility. At present efficiencies, however, the utility of this reactor concept must rest primarily on its ability to provide silent mobile power regardless of other performance characteristics.

AD-267 489 Div. 20
(TISTP/MFA) OTS price $14.50

Isotopes Inc., Westwood, N. J.
THE HIGH ALTITUDE SAMPLING PROGRAM. VOLUME 2A. RESULTS OF FILTER ANALYSES (LESS TABLE 4.3 AND FLIGHT CROSS-SECTIONS).
Final rept.,
ed. by James P. Friend, Herbert W. Feely and others. 31 Aug 61, 215p. incl. tables.
(Contract DA 29-044-XZ-609)
(DASA-1300, vol. 2a)
Unclassified report

DESCRIPTORS: (*Nuclear weapons, Tests, Radioactive fall-out, Sampling, *Stratosphere, Flight testing.) (*Radiochemistry, Data, Analysis, *Tables.) (Meteorological data, Radiosondes, Flight testing.)

During HASP more than 3600 filter samples of stratospheric dust were collected and analyzed radiochemically for various constituents of radioactive debris from nuclear weapon tests. The data from these analyses are presented here

in tables together with some of the important flight data from the sampling missions. Flight cross sections, on which are plotted the observed strontium-90 concentrations, are included to facilitate the visualization of the stratospheric distribution of the debris. (Author)

AD-267 495 Div. 20
(TISTP/MFA) OTS price $19.75

Isotopes Inc., Westwood, N. J.
THE HIGH ALTITUDE SAMPLING PROGRAM. VOLUME 5. SUPPLEMENTARY HASP STUDIES.
Final rept.,
ed. by James P. Friend, Herbert W. Feely and others. 31 Aug 61, 313p. incl. illus. tables.
(Contract DA 29-044-XZ-609)
(DASA-1300, vol. 5) Unclassified report

DESCRIPTORS: (*Nuclear weapons, Tests, *Radioactive fallout, Sampling, *Stratosphere, Flight testing.) (*Particles, *Radiographic analysis, Microtomes, Microscopy, Electron microscopy, Counting methods.) (Neutron activation, *Radioactivation analysis, *Radioactive isotopes, Metals, Chemical elements, Reagents.) (Radioactive fallout, *Radiation effects, Man, Animals, Soils.) (*Radiochemistry, Data, Quality control.) (Tables, Experimental data.) Aerosols.

A set of filter collections were obtained in connection with the HASP study of stratospheric particles. These samples were exposed for long time periods in the stratosphere. These analyses may provide estimates of the amounts of extra-terrestrial material present in the stratosphere. Physical methods employed in the studies of particles in filters and on impactors and the procedures and methods employed in the neutron activation studies are described. The results of the various analyses are presented and discussed. A discussion is presented of the implications of the results of the particle studies in regard to behavior of nuclear debris. A list of conclusions is also presented. (Author)

AD-267 496 Div. 20
(TISTP/MFA) OTS price $26.00

Isotopes Inc., Westwood, N. J.
THE HIGH ALTITUDE SAMPLING PROGRAM. VOLUME 2. RESULTS OF FILTER ANALYSES (TABLE 4.3 AND FLIGHT CROSS-SECTIONS ONLY).
Final rept.,
ed. by James P. Friend, Herbert W. Feely and others. 31 Aug 61, 530p. incl. illus. tables.
(Contract DA 29-044-XZ-609)
(DASA-1300, vol. 2b) Unclassified report

DESCRIPTORS: (*Nuclear weapons, Tests, Sampling, *Radioactive fall-out, *Stratosphere, Collection methods, Flight testing.) (Radiochemistry, Data, Analysis.) (*Flight, Experimental data.) *Tables.

AD-267 497 Div. 20
(TISTP/MFA) OTS price $19.75

Isotopes Inc., Westwood, N. J.
THE HIGH ALTITUDE SAMPLING PROGRAM. VOLUME 3. DISCUSSION OF HASP RESULTS.
Final rept.,
ed. by James P. Friend, Herbert W. Feely and others. 31 Aug 61, 307p. incl. illus. tables.
(Contract DA 29-044-XZ-609)
(DASA-1300, vol. 3) Unclassified report

DESCRIPTORS: (*Nuclear weapons, Collecting methods, *Tests, Radioactive fall-out, Sampling, Stratosphere, Flight testing.) (*Radiochemistry, *Fission product activity, *Distribution, Data.) Tables.

The general features of the stratospheric distribution of nuclear debris, as it is revealed by stratospheric concentrations of total beta activity, strontium-90, cesium-137 and pluotonium are discussed. The origins of this debris and the manner in which it has spread through the stratosphere are considered. Evidence on the origins and mixing patterns of the debris will be found not only in the stratospheric concentrations of the total beta activity and long lived isotopes but also in the concentrations of the tracer nuclides, tungsten-185, tungsten-181 and rhodium-102, of the short-lived fission products, cerium-144, strontium-89, zirconium-95, yttrium-91 and barium-140, and of the cosmic ray products, beryllium-7 and phosphorus-32. (Author)

AD-267 524 Div. 20
(TISTM/TCG) OTS price $2.60

Weizmann Inst. (Israel).
NUCLEUS-NUCLEUS REACTION CROSS-SECTION AT HIGH ENERGY COLLISIONS,
by G. Alexander and G. Yekutieli. 16 Aug 60, 26p. incl. illus. tables, 36 refs. (Technical note no. 1)
(Contract AF 61(052)371)
(AFCRL TN 60-677) Unclassified report

DESCRIPTORS: (*Nuclear reactions, *Nuclei, Nucleons, Cosmic rays, Energy, Excitation, Protons, Distribution, Electron bombardment, Cosmic ray bursts, Air, Photographic emulsions, Nuclear physics.)

The nucleon-nucleus and nucleus-nucleus reaction cross-sections are calculated according to the optical model and compared to observations at high energies. The optical model is able to predict the existing experimental data on the assumptions that the effective collision cross section in nuclear matter is equal to the free N-N total collision cross section and the nucleon distribution in a nucleus is similar to its change distribution. The observed nucleon-Fe reaction cross section is significantly lower than the predicted value. It appears that both the observed pion-He cross section and the reaction cross section of alpha-particles in emulsion are larger than the predicted values.

AD-267 529 Div. 20
(TISTM/TCG) OTS price $2.60

Weizmann Inst. (Israel).
MESON PRODUCTION IN NUCLEUS-NUCLEUS COLLISIONS,
by G. Alexander, J. Avidan, and others.
15 Nov 60, 23p. incl. illus. tables, 12 refs.
(Technical note no. 2)
(Contract AF 61(052)371)
(ARCRL-407) Unclassified report

DESCRIPTORS: (*Nuclear reactions, Cosmic

rays, Energy, Excitation, Nuclei, Production, *Mesons, Nucleons, Alpha particles, Recoil atom, Alpha particle reactions, Mathematical analysis, Geometry, Nuclear physics.) (Photographic emulsions, Cosmic ray bursts, Chemical elements, Ionization.)

Nucleus-nucleus collisions at cosmic ray energies are described by a simple geometrical model as a reaction in two stages: (a) Violent head-on collisions between incident and target nucleons in the overlapping volumes of the 2 colliding nuclei, in which many mesons and relativistic nucleons are formed, and make the jet of shower particles of the heavy primary stars in photographic emulsion. The average number of shower particles so produced is proportional to the average number of colliding incident nucleons; and (b) Nuclear excitation of the non-directly hit parts of both incident and target nuclei. This excitation causes in most cases the complete disintegration of the incident nucleus into nucleons, alpha-particles, and heavier fragments. The analysis of the angular distribution of protons and alpha-particles (black prongs) associated with large stars indicate a slight movement whose effective velocity is about 0.03 of the excited heavy (Br and Ag) target nuclei. (Author)

AD-267 531 Div. 20, 14
(TISTB/LH) OTS price $15.00

Lockheed Aircraft Corp., Sunnyvale, Calif.
SPACE ENVIRONMENTAL EFFECTS ON SEALS, GASKETS, ADHESIVES AND OTHER ELASTOMERIC AND POLYMERIC MATERIALS: AN ANNOTATED BIBLIOGRAPHY,
comp. by Helen M. Abbott. Sep 61, 218p. (Rept. no. 3-34-61-7; Special bibliography SB-61-40)
(Contract AF 04(647)673)
Unclassified report

DESCRIPTORS: (*Bibliography, *Space environmental conditions, *Materials, *Elastomers, *Polymers, *Seals, *Gaskets, *Adhesives, *Plastics, X rays, Ultraviolet radiation, *Radiation damage.)

This bibliography contains selected references on seals, gaskets, adhesives, sealants and other elastomeric and polymeric materials under space conditions. Environmental conditions that will effect materials in space are exposure to high vacuum, service temperatures and radiation. Radiation includes ultraviolet and high-energy radiation as appropriate to the application of the material. Any application of adhesives in fabricating pressurized containers and attaching solar cell plates were included as were any tests conducted on materials used for seals and gaskets in contact with reactive fluids such as, hydrazine, UDMH (unsymmetrical dimethyl hydrazine), N2O4 and red fuming nitric acid. Materials used for inflatable space vehicles and structures are included as general applications of plastics or polymers. (Author)

AD-267 613 Div. 20
(TISTP/MFA) OTS price $11.00

Isotopes Inc., Westwood, N. J.
THE HIGH ALTITUDE SAMPLING PROGRAM. VOLUME 4. THE APPLICATION OF HASP DATA.
Final rept.,
ed. by James P. Friend, Herbert W. Feely and others. 31 Aug 61, 146p. incl. illus. tables.
(Contract DA 29-044-XZ-609)
(DASA-1300, vol. 4) Unclassified report

DESCRIPTORS: (*Nuclear weapons, Tests, *Radioactive fall-out, Radioactive isotopes, Sampling, *Stratosphere, Flight testing.) (*Test methods, Precipitation, Data, Soils, Analysis.) (Radioactive isotopes, Strontium, Tungsten.) Tables.

The most direct approach to the determination of the surface burden of nuclear fallout involves the measurement of the concentrations of radionuclides on the land and in the oceans. Alternatively the concentrations of radioactivity may be measured in samples of precipitation and these data may be integrated to give the total deposition of nuclear debris during the time interval of interest. Such studies yield valuable information on the mechanisms involved in the deposition of fallout and in addition they permit estimates of the present and future radiological hazards to be made. This discussion concerns primarily past and future surface burdens of strontium-90 and tungsten-185 and their variations with time. Several workers have approached the problem of the calculation of the surface burden of world-wide fallout in different ways. A total of five alternative methods has been proposed, four of which include the use of precipitation data in conjunction with the results of analyses of soils for radioactive fallout. (Author)

AD-267 616 Div. 20
(TISTP/MFA) OTS price $14.50

Isotopes, Inc., Westwood, N. J.
THE HIGH ALTITUDE SAMPLING PROGRAM. VOLUME I. HASP PURPOSE AND METHODS.
Final rept.,
ed. by James P. Friend, Herbert W. Feely and others. 31 Aug 61, 219p. incl. illus. tables.
(Contract DA 29-044-XZ-609)
(DASA-1300, vol. 1) Unclassified report

DESCRIPTORS: (*Nuclear weapons, Tests, *Radioactive fall-out, Sampling, *Stratosphere, Flight testing.) (*Radiochemistry, *Radiographic analysis, Radioactive isotopes, Ruthenium, Cesium, Strontium, Cerium, Zirconium, Yttrium, Sodium, Calcium, Beryllium, Phosphorus, Rhodium.) (Laboratory equipment, Experimental data.)

The main work accomplished during the High Altitude Sampling Program has been the collection and radiochemical analysis of filter samples of stratospheric air. The sampling and analytical procedures are described in detail below. An explanation is given of the design of the sampling net and the accomplishments of the various phases of the collection program are reviewed. The number of samples collected during each phase and the sampling density within the various parts of the stratosphere are enumerated. The assumptions made in averaging data and in extrapolating the data to the regions of the stratosphere which were not sampled are described. The aircraft and the filter samplers mounted on them are described and the preflight procedures for preparing the samplers and the inflight procedures for exposing the filter samples are outlined. The nature of the filter medium is described and a summary is given of the work done in deducing its flow characteristics. A description is given of the sampling duct calibration programs and the principles used in calculating sampling efficiency are explained. (Author)

AD-267 635 Div. 20, 16
(TISTB/CCH) OTS price $10.10

Michigan U., Ann Arbor.
EFFECTS OF CONTINUOUS LOW LEVEL COBALT 60 GAMMA RADIATION ON A MAMMALIAN CELL SYSTEM.
Doctoral thesis,
by Alfred Hellman. 1961, 119p. incl. illus. tables, 157 refs.

Unclassified report

DESCRIPTORS: (*Radiation effects of *Gamma rays on *Cells (Biology) in Laboratory animals.) Dose rate, Survival, Radio protective drugs, Growth, Inhibition, Theses.

The objective of this study was the development of a sensitive cell culture system which would respond rapidly and repoducibly to low levels of chronic gamma radiation. If these essential requirements were met, the screening of potential radiation protective agents would be feasible since protection is normally measured by the quantitative response of the system in question. It was also considered possible that the quantitative characteristics of such a system would lend themselves to the understanding of basic biological responses of chronic irradiation. Prolonged irradiation of L-M cells resulted in an increased generation time which was quantitatively related to the dose rate. Other alterations noted were changes in cell viability, biochemical activity, and morphology. Utilizing these responses it was possible to study cell recovery, response to long term irradiation, temperature effects, and possible mechanisms of radiation damage. Screening of several potential protective agents was also carried out. The potential use and significance of this cell culture system are discussed. (Author)

AD-267 637 Div. 20
(TISTM/TCG) OTS price $1.10

Material Lab., New York Naval Shipyard, Brooklyn.
THE THERMAL INJURY UNDERNEATH CLOTHING.
Progress rept. no. 1, Apr-June 56,
by T. I. Monahan and W. L. Derksen. 10 Sep 56, 9p. (Lab. proj. no. 5046-16)
(AFSWP-1008) Unclassified report

DESCRIPTORS: (Thermal radiation, *Burns, *Radiation injuries, Radiation effects, Skin, Temperature, Laboratory animals, Rats, *Protective clothing, Effectiveness, Carbon arc lamps.) (Simulation, Skin and Thermal radiation from Nuclear explosions.)

Exposures of the rat to carbon-arc radiation, when in contact with the standard Hot-Wet uniform assembly were made for pulses of 0.5 and 3.3 sec. The uniform was a 5 oz/sq yd poplin over a 4 oz/sq yd sheeting; both fabrics had been laundered once, then overdried and stored at 65% RH. A cavity was placed in front of the cloth during the exposure to simulate negligible air supply. The burns were assessed immediately after exposure (2-10 min). The rats were also examined after 24 hr to note formation of scab. Analysis of the burn data indicate that the radiant exposure to cause a just perceptible or minimal white burn to rat skin 5.7 cal/sq cm for the 0.5-sec laboratory simulated-field pulse and 8.6 cal/sq cm for the 3.3-sec pulse. Temperatures of the surface of the rat skin were determined immediately prior to and during the exposures. Initial temperatures averaged 31 C. The maximum temperature rise corresponding to the 0.5-sec pulse, resulted in a rise to 64 C at 3 sec; the 3.3-sec pulse resulted in a rise to 61 C at 8.3 sec. The critical radiant exposure of unclothed or bare skin of the rats for the minimal white burn for the 0.5-sec pulse was 5.6 cal/sq cm and for the 3.3-sec pulse 7.4 cal/sq cm , which correspond to radiant exposures for the equivalent field pulse of 7.2 cal/sq cm and 9.5 cal/sq cm, respectively. The maximum temperatures of the skin are 91 C and 58 C for the 0.5- and 3.3-sec pulses, respectively. (Author)

AD-267 646 Div. 20
(TISTP/MFA) OTS price $8.10

North Carolina State Coll., Raleigh.
THE DETERMINATION OF THE GEOMETRIC BUCKLING OF A CYLINDRICAL ASSEMBLY WITH CONCENTRIC VOIDS BY THE PULSED NEUTRON METHOD.
Master's thesis,
by Jerry Albert Sawyer. 1961, 84p. incl. illus. tables, 37 refs.

Unclassified report

DESCRIPTORS: (*Cylindrical bodies, Aluminum, *Buckling.) (*Neutrons, Neutron flux density, Transport properties, Neutron cross sections, Neutron age, Half life.) (Graphite moderated reactors, Van de Graaf generators, Oscilloscopes, *Pulse analyzers.) (Experimental data, Analysis.) (Transformations (Mathematics), Diffusion, Equations, Tables.)

The effect of concentric cylindrical voids on the geometric buckling for a finite cylindrical assembly was measured using the pulsed neutron technique. A 1 Mev Van de Graaf accelerator supplied bursts of neutrons to ordinary distilled water at 28 C contained in an aluminum cylinder with an inside diameter of 11.946 inches and a height of 12.52 inches. With the water height maintained constant at 10.88 inches, voids with a constant outer radius of 3.46 inches were formed in incremental thicknesses of 0.5 inch up to a maximum gap width of 2 inches. The buckling of the assembly was calculated from the measured neutron lifetimes with diffusion parameters obtained by Epling (M.S. Thesis, Noth Carolina State College, 1960). Agreement of theory with experiment was good for small void thicknesses. For gap widths of 1.5 inches and greater the observed buckling was larger than that calculated due to the axial streaming present for finite cylinders. (Author)

AD-267 706 Div. 20
(TISTP/MFA) OTS price $11.50

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ATOMIC ENERGY (SELECTED ARTICLES)
6 Oct 61, 158p. incl. illus. tables (Trans. no. FTD-TT-61-30 of Atomnaya Energiya 10:565-633, 1961)

Unclassified report

DESCRIPTORS: (*Atomic energy, Atomic energy engineering, *Power reactors, Reactor fuels.) (Neutron cross sections, *Radioactivity, Half life, Radioactive isotopes, Radioactive decay, Fission, *Nuclear reactions.) (Materials, Graphite, Lithium, Fluorides, Plutonium, Iridium, Phosphors, Potassium, Radium, Uranium, Thorium.) (Gamma emission, Dosimeters, Radiation counters.) (Experimental data, Measurement, Tables.) (Translations, USSR.)

CONTENTS: Partial fuel reloading in nuclear reactors, The effect of irradiation on certain

properties of graphite, The neutron yield from reactions Li6(t,n) and Li7(t,n), The effect that the addition of certain compounds has on the oxidation of uranium in acids, Investigation of the system PuO2F2 - HF - H2O (20 C isotherm), Coverings for structural elements in radioactive buildings, Certain questions of thermal strength in reactor engineering, Anisotropy of fission fragments of Pu240 and Pu239 nuclei, Half-life of Cs137, The problem of the thermodynamic cycles of atomic power stations, The influence of the material composition of uranium ores on the scintillation spectrum of their gamma-radiation, Determination of the contents of radium, thorium, and potassium in rocks from an airplane, The use of a CaSO4-Sm phosphor in dosimetry, The maximum possible concentrations of radioactive isotopes of inert gases from fission, The separation of neon isotopes by the thermal diffusion method.

AD-267 726 Div. 20
(TISTM/TCG) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADIOACTIVE PROPERTIES OF FISSION-FRAGMENT PREPARATIONS,
by A. G. Bykov, P. V. Zimakov, and V. V. Kulichenko. 14 Nov 61, 11p. incl. illus. tables. (Trans. no. FTD-TT-61-60 of Atomnaya Energiya, pp. 362-367, Apr 61)
Unclassified report

DESCRIPTORS: (Uranium, *Fission products, *Radioactive isotopes, Radioactivity, Preparation, Separation of Beta particles, Gamma rays, Isotopes, Mixtures from Cesium, Strontium, Yttrium.) (Radioactive mean life, Radioactive decay, Beta decay, Half life, Energy, Sources.) (USSR, Translations, Technological intelligence.)

In connection with the difficulty of their obtainment and the high cost of the sources of ionizing radiations from separate fission-fragment isotopes, it is expedient to examine the possibility of using sources from unseparated mixtures of uranium fission products. Calculated and experimental data are presented concerning the change with time of energy and the intensity of the total, and also beta-mixtures. It is pointed out, that the average energy of beta-active isotopes reach the maximum with 2-yr fragments, but gamma-active isotopes with fragments 2 to 6 mo old. (Author)

AD-267 840 Div. 20
(TISTP/MFA) OTS price $6.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
A CERENKOV RADIATOR FOR THE PRODUCTION OF MILLIMETER AND SUBMILLIMETER WAVES,
by Charles E. Enderby. 10 Jan 61, 62p. incl. illus. table (Technical note no. 1)
(Contract AF 33(616)7043, Proj. 4237)
(WADD TN 61-1) Unclassified report

DESCRIPTORS: (*Cerenkov radiation, *Particle accelerators, *Electromagnetic waves, Microwaves, Extremely high frequency, Electron beams, Wave transmission, Dielectrics, Power.) (Instrumentation, Design.) (Harmonic analysis, Partial differential equations, Quantum mechanics.) (Laboratory equipment, Experimental data.)

A method is presented by which millimeter and submillimeter power can be generated and radiated into free space at the watt level. The method uses a combination of electronic and physical optic techniques. The electronic technique involved is the generation of Cerenkov power by passing a bunched megavolt electron beam through a non-resonant isotropic dielectric medium. The optical techniques are used to shape the dielectric to form the desired radiation pattern. One dielectric shape is analyzed that has produced 0.6 watts of power at a wavelength of 8 millimeters in a fairly sharp pattern. The pattern width was about 6 degrees and the pattern was accurately predicted by the theory. With the same cone, the pattern width becomes sharper at higher frequencies and the power level can be made to stay at about the same level or higher by using a K-band Rebatron instead of the S-band one now being used. (Author)

AD-267 889 Div. 20
(TISTP/MFA) OTS price $1.60

California U., Los Angeles.
THE NEW GENERATION OF MEDIUM - ENERGY CYCLOTRONS,
by K. R. MacKenzie. Nov 61, 8p. illus.
(Contract Nonr-23344)
Unclassified report

DESCRIPTORS: (*Cyclotrons, Energy, Design.)

AD-268 060 Div. 20, 4
(TISTP/MFA) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A SCINTILLATION THERMAL NEUTRON DETECTOR,
by Yu. K. Khudenskiy, Yu. A. Tsirlin, and M. N. Baisova-Karakayeva. 1 Dec 61, 2p. (Trans. no. FTD-TT-61-261 of Byulleten' Izobreteniy, Patent no. 133540, No. 22, pp. 25, 1960)
Unclassified report

DESCRIPTORS: (*Neutron detectors, *Thermal neutrons, Design.) (Chemicals, Glycerols, Phosphors, Boron compounds.) (Translations, USSR.)

21. NUCLEAR PROPULSION

No Entries

22. ORDNANCE

AD-267 268 Div. 22, 12
(TISTP/JW) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
SOME AERODYNAMIC PROPERTIES OF A 105-MM MODEL OF THE 155-MM T-358 SHELL,
by W. E. Scott. Sep 61, 34p. incl. illus. tables (BRL memo. rept. no. 1369)
(Proj. 503-03-001)
Unclassified report

DESCRIPTORS: (*Aerodynamics, *Projectiles, Exterior ballistics.) (Stability, Yaw, Spin, Drag.)

The aerodynamic properties of a 105 mm model of the 155 mm T-358 shell are discussed. Subsonically, at small yaw, the model has a serious case of dynamic instability as indicated by a rapid divergence of the precessional component of yaw. It is shown that this instability is due to Magnus effects, and that these effects cannot be circumvented by firing at a different spin. However, because of past experience with similar shell, it is conjectured that this dynamic instability is a small yaw phenomenon and that a limit cycle is present. As a consequence of this, the dispersion will not be markedly affected.

AD-267 270 Div. 22, 9
(TISTP/GRW) OTS price $4.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
THE FREE FLIGHT STABILITY OF A LIQUID-FILLED SHELL. PART Ib. INCOMPRESSIBLE, INVISCID LIQUID; PARTIALLY FILLED, RIGHT CYLINDRICAL CAVITY,
by W. E. Scott. July 61, 56p. incl. tables.
(BRL rept. no. 1135)
(Proj. 503-03-001)
Unclassified report

DESCRIPTORS: (*Projectiles, *Exterior ballistics, Stability, Liquids.) (*Projectiles, *Yaw, Dynamics, Mathematical analysis, Differential operations, Integral transforms, Damping.) (Bodies of revolution, Stability, Oscillation.)

The linearized differential equation of yawing motion of a non-rolling, statically stable shell containing a right cylindrical cavity partially filled with an incompressible liquid is derived. The Laplace transform of this equation is shown to lead to an algebraic equation, the roots of which (in the absence of aerodynamic damping) are purely imaginary. The liquid aside from altering the inertial properties of the empty shell, affects only the frequency of the motion. There is no contribution to the damping of the system. (Author)

AD-267 289 Div. 22
(TISTW/JRG) OTS price $19.75

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
SURVEY OF HYPERVELOCITY IMPACT INFORMATION,
by Walter Herrmann and Arfon H. Jones. Sep 61, 316p. incl. illus. tables, 153 refs. (Rept. no. 99-1)
(Subcontract to Lincoln Lab., Mass. Inst. of Tech., Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: (*Impact shock, *Cratering, *Penetration, Targets, *Metals, *Hypervelocity projectiles, Particles, Rods.) (Impact shock, Cratering, Penetration, Targets, Metals, Bibliography, Terminal ballistics, Data, Theory, Mathematical analysis, Tests.) (Impact shock, Cratering, Penetration, Hypervelocity vehicles, Spaceships.) Shaped charges.

In this volume information relating to cratering and penetration in metallic targets has been gathered. Impact of compact particles, microparticles, and rods at normal and oblique incidence on quasi-infinite targets and on thin targets, multiple spaced targets, and shielded targets is considered. Experimental data are presented in tabular and graphical form for ready references. Available theories and semiempirical theories, as well as empirical correlation equations are summarized and compared with each other and with the experimental data. For normal impact on quasi-infinite targets 2 empirical correlation expressions are deduced which are more generally applicable than previous expressions. A qualitative description of the cratering process is given, and realistic regions of impact are defined. Recommendations for future experimental and theoretical work are made. (Author)

AD-267 290 Div. 22
(TISTW/JRG) OTS price $13.00

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
SURVEY OF HYPERVELOCITY IMPACT INFORMATION,
by Walter Herrmann and Arfon H. Jones. Oct 61, 170p. (Addendum to rept. no. 99-1, AD-267 289)
(Subcontract to Lincoln Lab., Mass. Inst. of Tech., Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: (Tables, Ballistics, Data, *Penetration on *Cratering and Targets, *Metals of *Hypervelocity projectiles by Particles, Rods.)

In the survey of high velocity impact information, a great deal of data was accumulated. Considerable difficulty was experienced in extracting original measured quantities, and originating laboratories were contacted whenever possible to supply tabulated data and additional information concerning material properties and measuring techniques. In some cases, such information was no longer available, and information was extracted from graphical data plots, and material properties corresponding to the material specifications were extracted from handbooks. The collected data are organized and presented under separate headings according to the projectile-target configuration. (Author)

AD-267 354 Div. 22, 30, 2
(TISTW/JRG) OTS price $6.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
FEASIBILITY TEST OF AN UPPER ATMOSPHERE GUN PROBE SYSTEM,
by Spence T. Marks, Leonard C. MacAllister and others. Oct 61, 70p. incl. illus. tables, 11 refs. (Memo. rept. no. 1368)
(DA Proj. 503-06-011)
Unclassified report

DESCRIPTORS: (Feasibility studies, Design, Tests, *Guns, *Fin stabilized ammunition, Sabot projectiles, Projectiles, Instrumentation, *Atmospheric sounding, Meteorological data.) (Optical tracking, Radar tracking, Fin stabilized ammunition, Projectiles, Radar confusion reflectors, Upper atmosphere.)

The feasibility test of an upper atmosphere gun probe system, which employs a smooth bore 120mm gun, and a fin stabilized (non-spinning) 60mm probe, is described. The results obtained from the first and second vertical test series are given (a total of 12 rounds). The present gun probe system is evaluated, and the future prospects for such a system are discussed. (Author)

AD-267 355 Div. 22
(TISTW/JRG) OTS price $2.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
ELECTRICAL MEASUREMENTS IN DETONATING PENTOLITE AND COMPOSITION B,
by Robert L. Jameson. Sep 61, 33p. incl. illus. table, 13 refs. (Memo. rept. no. 1371)
(DA Proj. 503-04-002)
Unclassified report

DESCRIPTORS: (*Explosives, *Pentolite, TNT, RDX, Barium compounds, Nitrates, *Detonation, Measurement, *Electrical conductance, Electrical effects, Resistance.)

The mean resistivity of detonating pentolite (0.89 ohm-cm) and Comp. B (0.29 ohm-cm) was measured. The zones of highest conductivity in 2.5 cm diam pentolite and Comp. B charges were about 1 cm long at the axis of the charge, narrowing to less than 0.1 cm at the surface. Measurements of the precise position of the conduction front in baratol indicate that it is located within the von Neumann spike. (Author)

AD-267 379 Div. 22, 30
(TISTP/GRW) OTS price $8.60

Operations Research, Inc., Silver Spring, Md.
SENSITIVITY ANALYSIS OF OPERATIONAL EFFECTIVENESS: CW/BW WEAPONS SYSTEMS.
Annual comprehensive rept., vol. 2, 15 Aug 60-15 Aug 61 on Proj. Pharos,
by Roger C. Eyler, Reynold Greenstone and others. 31 Aug 61, 88p. incl. illus. (Technical rept. no. 148, vol. 2)
(Contract DA 18-108-cml-6554)
Unclassified report

DESCRIPTORS: (*Projectiles, Sensitivity, Operation, *Chemical warfare, *Biological warfare.) (*Exterior ballistics, Projectiles, Simulation, *Computers, Programming, Fragmentation.)

This volume presents the specific computer simulation that was devised and tested. The conventional computer flow charts are presented, and symbols used in the flow charts are defined and a description of the flow charts is given. The literal computer program for tl simulation is presented. In order to achieve generality in application, two versions of the program, one in ALGOL and the other in FORTRAN, were prepared and are presented. (Author)

AD-267 404 Div. 22
(TISTW/JRG) OTS price $1.60

Frankford Arsenal, Philadelphia, Pa.
EVALUATION OF FELTED NITROCELLULOSE PROPELLANT ENVELOPES IN RECOILLESS WEAPONS,
by R. Rhodes. Oct 61, 12p. incl. illus. tables. (Memorandum rept. no. M62-5-1)
(DA Proj. no. 502-01-008)
Unclassified report

DESCRIPTORS: (Fibers, Nitrocellulose, *Cartridge cases as *Recoilless rifles for *Propellants, Propelling charges, Effectiveness, Tests.) (Recoilless rifles, Ballistics.)

Presently, recoilless rifle ammunition makes use of one of two basic types of propellant containers: the perforated metal case and the frangible propellant envelope. This study was designed to investigate the feasibility of using a combustible nitrocellulose envelope to eliminate the problems connected with both of the above types of case. Results indicate suitability of the combustible envelope for use in recoilless weapons. (Author)

AD-267 406 Div. 22, 28
(TISTW/JRG) OTS price $2.60

Frankford Arsenal, Philadelphia, Pa.
A TANK TRACKING SIMULATOR FOR HUMAN ENGINEERING STUDIES,
by A. C. Karr. June 61, 23p. incl. illus. tables (Rept. no. R-1594)
Unclassified report

DESCRIPTORS: (Simulation of Tracking of Tanks by Electronic equipment, Design, Tests.) (*Antitank guns and *Weapons, *Human engineering, Tests.)

An electronic tank tracking simulator was developed for human engineering studies of various antitank weapons. Its essential design features and operating characteristics are described. One of the experiments conducted with this simulator is presented. The experiment deals with gunner position for the heavy antitank weapon XM89. The purpose was to determine whether or not any advantage would be gained by changing the gunner's position to the right side of the weapon where he would operate the joy-stick with his right hand and the trigger grip with his left. The results show no advantage and the conclusion is made that the present concept of placing the gunner on the left side of the weapon with the joy-stick in his left hand should be retained. Other related findings are discussed. (Author)

AD-267 437 Div. 22, 14
(TISTE/CDM) OTS price $1.10

Zenith Plastics Co., Gardena, Calif.
DESIGN AND DEVELOPMENT OF LAUNCHING PISTON XMI (FIBERGLASS, COMPOSITE).
Progress rept., 1-30 Sep 61,
by Harold H. Jensen. 1 Oct 61, 3p. (Rept. no. ZPR 49178-11)
(Contract DA 04-495-501-ORD-3167)
Unclassified report

DESCRIPTORS: (Launching, *Pistons, *Glass textiles, Resins, Density, Hardness, Reinforcing materials.)

AD-267 438 Div. 22, 14
(TISTE/CDM) OTS price $1.10

Zenith Plastics Co., Gardena, Calif.
DESIGN AND DEVELOPMENT OF LAUNCHING PISTON XMI (FIBERGLASS, COMPOSITE).
Progress rept., 1-31 July 61,
by Harold H. Jensen. 1 Aug 61, 3p. (Rept. no. ZPR 49178-9)
(Contract DA 04-495-501-ORD-3167)
Unclassified report

DESCRIPTORS: (Launching, *Pistons, *Glass textiles, Resins, Density, Hardness, Reinforcing materials.)

AD-267 439 Div. 22, 14
(TISTE/CDM) OTS price $1.10

Zenith Plastics Co., Gardena, Calif.
DESIGN AND DEVELOPMENT OF LAUNCHING PISTON XMI (FIBERGLASS, COMPOSITE).
Progress rept., 1-31 Aug 61,
by Harold H. Jensen. 1 Sep 61, 3p. (Rept. no. ZPR 49178-10)
(Contract DA 04-495-501-ORD-3167)
Unclassified report

DESCRIPTORS: (*Pistons, *Glass textiles, Resins, Density, Hardness, Reinforcing materials, Launching.)

AD-267 596 Div. 22, 13, 30
(TISTP/MFA) OTS price $4.60

Forest Service, Washington, D. C.
THE PRESHOCK SOUND VELOCITY FIELD OVER INORGANIC AND ORGANIC SURFACES. A PROBLEM ANALYSIS AND STATUS REPORT.
Interim technical rept.,
by F. M. Sauer. Dec 54, 46p. incl. illus. tables.
(AFSWP-420) Unclassified report

DESCRIPTORS: (*Shock waves, *Nuclear explosions, Terrain, Surface properties, Sound, Velocity, *Thermal radiation.) (Organic materials, Inorganic substances, Soils, Sand, Concrete, Rock.) (Experimental data, Tables.) *Bibliography.

Existing information concerning the development, during nuclear detonations, of preshock sound velocity fields caused by irradiation of inorganic and organic surfaces is analyzed. Experimental results are compared with available theoretical analyses and the influence of surface thermal properties is discussed. Surface temperatures calculated from theoretical results based on the assumption of a homogeneous media and using published thermal properties are inconsistent with temperatures measured during actual detonations. A vigorous experimental progran appears necessary in view of the deficiencies of theoretical attack, especially in the case of organic surface materials. Specific recommendations on the objectives of such programs are presented. Conventional modes of convective heat transfer are shown to explain observed depths of thermal layers over inorganic surfaces if compressibility is considered. (Author)

AD-267 597 Div. 22
(TISTW/RD) OTS price $1.60

Frankford Arsenal, Philadelphia, Pa.
ANALYSIS OF THE JUNGHANS ESCAPEMENT SPRING; RESTORING TORQUE VS. ANGULAR DEFLECTION FOR STATIC CONDITIONS,
by E. Pearson. June 61, 12p. incl. illus.
(Memo. rept. M61-35-1)
(Proj. nos. OMS 5530.11.557 and DA 505-01-003)
Unclassified report

DESCRIPTORS: *Cantilever beams, *Springs, *Time delay fuzes, Deflection, Mathematical analysis.

An analysis of the Junghans spring was extended from the usual linear relations to examination of the nonlinear limitations. Large deflections of a cantilever beam, with a concentrated end load perpendicular to the beam, form the basis of the analysis. The spring constant (restoring torque vs. angular deflections) for various arbor/length ratios is calculated in dimensionless form and plotted as a function of angular deflection. (Author)

AD-267 602 Div. 22
(TISTE/CDM) OTS price $3.60

Diamond Ordnance Fuze Labs., Washington, D. C.
TRANSMITTER MOD-SPM FOR TELEMETRY,
by Fred R. Nemir. 15 Nov 61, 36p. incl. illus. tables (DOFL rept. no. TR-983)
(DOFL Proj. no. 43800)
Unclassified report

DESCRIPTORS: (*Telemeter systems, *Spin stabilized ammunition, Projectiles, Radio transmitters, Design, Test equipment.) (Radiofrequency, *Telemetering transmitters, Spin, Pulse modulation, Tests, Antenna radiation patterns.)

A description is given of the transmitter Mod-SPM, referred to as spin transmitter. Essentially it is a negative-grid oscillator employing two triodes in balanced circuit driving a split-loop antenna. It is used for measuring the rate of spin of the XM390 projectile and requires little or no modification of the vehicle. Frequency of operation is approximately 220 to 230 mc and radiated power of the unit is 200 mw. Configuration of the test site and location of the transmitter were such that toroidal nulls and maxima were recorded by a receiving station. The spin rate of the vehicle is equal to the number of nulls provided by one-half the flight time. (Author)

AD-267 693 Div. 22
(TISTW/JRG) OTS price $1.60

RAND Corp., Santa Monica, Calif.
DETERMINATION OF EXPECTED COVERAGE AND OF EXPECTED DAMAGE, SINGLE BOMB OF LARGE LETHAL AREA,
by H. H. Germond. 28 Oct 49, 17p. incl. illus. table (Rept. no. RM-274)
(Contract AF 33(038)6413, Proj. RAND)
Unclassified report

DESCRIPTORS: (*Ammunition damage, *Bombs, Effectiveness.) (Photoelectric cells, Integrators, *Targets, *Vulnerability, Mathematical analysis, Probability, Integral equations.)

In applying the photoelectric coverage machine to the determination of the expected coverage when a single bomb of large lethal area is used against an area target, it is only necessary to replace the Gaussian transparency with one whose transparency at each point is proportional to the integral of the Gaussian over the area of an

offset circle with center at that point. Under certain conditions this may be approximated by another Gaussian transparency. Determination of the expected damage is obtained by replacing the simple cut-out target mask with one whose transparency at any point is proportional to the value of the damage achieved if that point falls within the lethal area of the bomb. Appendixes give the moments of the lethal probability function, and its integral over a central circle of given radius. (Author)

AD-267 763 Div. 22, 20, 6, 30
(TISTP/CCH) OTS price $7.60

Stanford Research Inst., Calif.
SMALL EXPLOSION TESTS.
Interim rept. no. 3 on Phase 2 of Proj. MOLE, Oct-Nov 54,
by D. C. Sachs and L. M. Swift. Dec 54, 79p. incl. illus. tables.
(Contract DA 04-167-eng-709)
(AFSWP-290) Unclassified report

DESCRIPTORS: (Tests, *Explosions, Analysis.) (*Earth, Stresses, Pressure, Acceleration, Blast, Measurement, Range tables, Instrumentation, Mathematical prediction, *Gages.) (Particles, Velocity.) (*Underground explosions, *Nuclear explosions, Atomic bomb explosions.) (Nuclear explosions, Atomic bomb explosions, Simulation.)

The investigation is concerned with the reporting and preliminary analysis of data obtained from the explosion of six charges fired as part of Phase II of Project MOLE. The MOLE investigations are designed to yield information to assist in predicting the effects of very large explosions. The Phase II-B charges, 256 pounds of TNT each, were fired at various depths at a site adjacent to the proposed ground zero of the TEAPOT ESS shot. The results from Phase II-B are presented and partially analyzed; the measurements appear to possess excellent self-consistency and reproducibility. The Phase II-B data are compared with data from larger scale tests and an effort is made to predict some significant results for TEAPOT Shot ESS. (Author)

AD-267 807 Div. 22
(TISTW/JRG) OTS price $3.60

Miller Research Labs., Baltimore, Md.
PRODUCTION ENGINEERING OF PLASTIC COMPONENTS FOR 81 MM T214E2 ILLUMINATING CARTRIDGE.
Monthly progress rept. no. 4, 1-31 Oct 61,
by E. R. Briggeman. 8 Nov 61. 35p. incl. tables (Rept. no. 251-4)
(Contract DA 36-034-ORD-3468)
Unclassified report

DESCRIPTORS: (*Illuminating projectiles, Fin stabilized ammunition, Rocket motors, Spoilers, Design, Production, Tests.) (Illuminating projectiles, Fin stabilized ammunition, Cartridge cases, Plastics, Materials, Production.)

AD-267 876 Div. 22
(TISTE/CDM) OTS price $2.60

Naval Ordnance Lab., White Oak, Md.
CHARACTERIZATION OF SQUIB, MK 1 MOD 0: THERMAL STACKING FROM RADAR-LIKE PULSES,
by L. D. Hampton and J. N. Ayres. Oct 61, 23p. incl. illus. table (Rept. no. NOLTR 61-108)
Unclassified report

DESCRIPTORS: (Ordnance, Naval ordnance, Electromagnetic waves, Wave transmission, Hazards.) (*Electric detonators, Radar pulses, Detonation, Wire, Tests, Temperature.)

The electro-thermal equations describing the heating and cooling of wire bridge electro-explosive devices are solved for constant-current radar-type input pulses. The bridgewire temperature-time history is obtained for a variety of pulse amplitudes and repetition frequencies. Equilibrium temperatures are obtained for the varied input conditions and are all combined in a single nomograph. If the hot-spot theory is assumed the conditions for explosion can be deduced. For instance, for the Mk 1 squib, a temperature rise of 500 C will result if the value of I2RW is 1,000 microjoules at a very low pulse repetition frequency (below 60 cps.) or is 100 microjoules at a frequency of 2,000 cps. This temperature rise would be expected to cause the squib to fire approximately 50% of the time. (Author)

AD-267 877 Div. 22, 26
(TISTE/CDM) OTS price $3.60

Naval Ordnance Lab., White Oak, Md.
THE FABRICATION BY PROJECTION WELDING TECHNIQUES OF FINE WIRE BRIDGES FOR ELECTRO-EXPLOSIVE DEVICES,
by E. Eugene Kilmer. Oct 61, 32p. incl. illus. tables (Rept. no. NOLTR 61-119)
Unclassified report

DESCRIPTORS: (*Electric detonators, Wire, *Welding, Nickel alloys, Nickel, Manufacturing methods.) (Welds, Climatic factors, Tests.)

An improved method for attaching bridgewires to the leads of electro-explosive initiator assemblies was developed. Nickel tabs, to which has been swaged the bridgewire, are projection welded to the contact pins. A discussion of the technique, optimum conditions for welding the nickel tab to several nickel alloys, and an analysis of the weld are presented. Several welded bridgewire assemblies functioned satisfactorily after subjection to standard environmental tests. (Author)

AD-267 884 Div. 22
(TISTW/JRG) OTS price $8.10

General Electric Co., Burlington, Vt.
PROJECT VULCAN RESEARCH AND DEVELOPMENT.
Progress rept. no. 30, 1 Aug-30 Sep 61,
by R. H. Barrett. 31 Oct 61, 78p. incl. illus. tables (Rept. no. R61APB769-30)
(Contract DA 19-020-ORD-5455)
Unclassified report

DESCRIPTORS: (*Aircraft guns, *Automatic weapons, Design, Tests.) (Aircraft guns, Automatic weapons, Torque, Reduction.) (Aircraft guns, Automatic weapons, Cams, Design.) (Aircraft guns, Automatic weapons, Boresighting.)

The following projects and studies are discussed: (1) Torque reduction: needle bearing roller shafts, MIL-L-46000 oil with 20% Teflon #5, rear track spacers; (2) Boresighting and target studies: data on production guns, accuracy determination at 3000-in. range, results of push-pull configuration for phase 2A and 2B, effective length of barrels; (3) Gun components: front track bolts, bolt body insulation, bolt shaft modification, music wire firing pins, radial muzzle clamp lock; (4) firing records; and (5) Appendix: (New cam design). (Author)

AD-268 036 Div. 22, 32, 26
(TISTB/CW) OTS price $9.10

Duke U., Durham, N. C.
PHYSICAL INVENTORY ACCOUNTING PROGRAM,
by Wayne B. Ferrell and Marion R. Bryson.
1 Oct 61, 96p. incl. tables (Technical rept. no. 10)
(Contract DA 31-124-ORD-10-3)
Unclassified report

DESCRIPTORS: (*Ordnance, Army, *Supplies, Distribution, Storage, *Supply depots, Quality control, Errors, Records, Sampling, Mathematical analysis.)

Two problems still exist: (1) there must be developed a method of determining easily when an item was last inventories; and (2) the disposal of inventory records should be outlined. The first has two workable solutions. If the activity counter is readjusted to zero every time an inquiry for an inventory balance is made and if the contents of the activity counter are printed in the opening balance in the Daily Activity Register, this would solve the problem. A history could be carried back until the activity counter shows zero. This would be the first activity following inventory. The second solution is to print a dummy transaction in the D.A.R. for each item inventoried. The first of these solutions is simpler since it is all automatic and requires no additional work except initial programming. (Author)

AD-268 058 Div. 22, 17
(TISTE/CRJ) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
WINDOWS INTO THE UNKNOWN,
1 Dec 61, 1p. (Trans. no. FTD-TT-61-297 of Komsomol'skaya Pravda, pp. 1, 27 Sep 61.)
Unclassified report

DESCRIPTORS: (Explosions, *Underwater Explosions, Mining Engineering, *Geophysical Prospecting.) Aerial Reconnaissance. (Technological intelligence, Translations, USSR.)

This article deals with some achievements of the Siberian Branch of the Academy of Sciences of the USSR. The Hydrodynamics Department is working on problems of peaceful explosions to be used in prospecting and in building dams and embankments. The Novosibirsk river port was deepened by means of underwater explosions, and work is being done on the Angara River. The Department has also developed a water cannon to be used in mining. New geophysical apparatus was developed; this is used in aerial surveying of mineral deposits, increasing the reconnaisance output 300-fold.

AD-268 079 Div. 22
(TISTM/EJH) OTS price $3.60

Diamond Ordnance Fuze Labs., Washington, D. C.
STABILITY OF MANGANESE DELAY MIXTURES,
by R. H. Comyn, M. L. Couch and R. E. McIntyre.
27 Nov 61, 35p. incl. tables (DOFL rept. no. TR-965)
(Proj. 46100)
Unclassified report

DESCRIPTORS: (Time delay fuzes, *Delay powders, Mixtures of Manganese, Lead compounds, Chromates and Barium compounds, Storage, Moisture, Stability, Temperature.) (Powder metals, *Manganese, Crystals, Surfaces, Oxidation.)

The storage stability of Mn-$PbCrO_5$-$BaCrO_4$ delay mixtures was investigated. When these mixtures were kept dry their burning times did not increase more than 5% during 8 wk storage at 165 F. Some batches did not change their burning times when stored without sealing at 100% RH, 165 F. Other batches deteriorated rapidly under the same conditions. This wide variation in storage stability is due to differences in the Mn powder used in preparing them, and apparently, is connected with the Mn crystallite size and surface oxidation. Pretreatment of the Mn is not recommended for improving the stability of these mixtures. Recommendations for further work include a study of crystallite size and methods of preparing Mn powder free of surface oxides. (Author)

23. PERSONNEL AND TRAINING

AD-267 326 Div. 23, 30, 28
(TISTB/MS) OTS price $2.50

Psychological Research Associates, Inc., Arlington, Va.
DEVELOPMENT OF TRAINING EQUIPMENT PLANNING INFORMATION.
Rept. for June 60-Feb 61 on Technical Guides for Designers of the Personnel Subsystem for New Weapon Systems,
by Robert G. Demaree. Oct 61, 108p. incl. illus. tables, 65 refs.
(Contract AF 33(616)7464, Proj. 7190)
(ASD TR 61-533) Unclassified report

DESCRIPTORS: (*Training devices, Design, *Human engineering, Standards, Selection, Training, Air force equipment, Effectiveness.)

In the development of Air Force Systems, the timely procurement and delivery of training equipment is essential. Many human factors and engineering considerations enter into the determination as to what items of training equipment will best serve the purposes of a particular system. This report attempts to take proper account of both the engineering and human factors considerations but places special emphasis upon the latter. The report is divided into seven sections entitled: Introduction, An Overview of Training Equipment Planning, Training Functions for Various Types of Training Equipment, Training Equipment Utilization, Training Equipment Effectiveness Characteristics, Training Equipment Costs, and TEPI Development. The appendices cover: Explanation of Terms, The Personnel Subsystem and Its Elements, and a Selected Bibliography. Liberal use is made of graphic and tabular presentations to illustrate the principles presented. (Author)

AD-267 666 Div. 23, 28
(TISTB/MS) OTS price $7.60

Ohio State U. Research Foundation, Columbus, Ohio.
TEAM TRAINING III: AN APPROACH TO OPTIMUM METHODS AND PROCEDURES,
by John E. Horrocks, Emil Heermann, and Robert E. Krug. 8 Aug 61, 67p. incl. illus. tables, 57 refs.
(Contract N61339-198)
(Technical rept. no. NAVTRADEVCEN 198-3)
Unclassified report

DESCRIPTORS: (*Military training, *Group dynamics, *Learning, Behavior, Effectiveness.) (Military personnel, *Naval personnel, *Military training, Training devices.) (Group dynamics, Bibliography.)

This study deals with laboratory investigations using structured, task oriented, three-man teams during the acquisition phases of learning. Results of the experiments with these teams indicated that team performance was closely associated with individual competence and that training designed toward enhancing team coordination was either ineffective or unnecessary within the tasks set by the experiments. Additional experiments demonstrated that the effectiveness of a given training procedure is affected by other procedures such that the usefulness of one should not be determined without considering its interactions with the others. From the basis of these experiments it is suggested that for small, tightly organized team groups in the Navy the acquisition phase of learning stress individual performance rather than team coordination. (Author)

AD-267 799 Div. 23, 28
(TISTB/CW) OTS price $2.60

Illinois U., Urbana.
VALIDATION OF AIR FORCE CLASSIFICATION TESTS AGAINST ACADEMIC GRADES IN AN AVIATION HIGH SCHOOL,
by Lloyd G. Humphreys. Aug 61, 17p. incl. tables.
(Contract AF 41(657)279, Proj. 7717)
(ASD TN 61-51) Unclassified report

DESCRIPTORS: (*Aviation personnel, Selection, Classification, *Aptitude tests, Reliability.)

Air Force classification tests and the Army General Classification Test were validated against individual course grades in an aviation high school. Course grades showed low to moderate levels of reliability, with those in the terminal aviation-mechanic curriculum somewhat less reliable than grades in the pre-engineering technical curriculum. Most of the multiple correlations of classification test scores with course grades were at a usefully high level. Highest correlations with Air Force aptitude indexes were somewhat lower, and correlations with AGCT still lower. For selection purposes the Air Force classification tests do a better job than the AGCT general intelligence test. The Air Force tests that have the highest utility for selection are Arithmetic Reasoning, Physics, and Pattern Comprehension. Additional mechanical and numerical content, as well as the use of keyed biographical data items, may improve prediction in this school situation. This is the first of a series of reports detailing the long-range validity of Air Force selection tests for technical academic criteria. The Aviation High School provides a unique opportunity for collection of predictor and criterion information for the same individuals over an extended period of time. (Author)

AD-268 042 Div. 23, 6, 25
(TISTW/RD) OTS price $15.00

Servo Corp. of America, Long Island, N. Y.
APPLICATION OF INFRARED TECHNIQUES TO MILITARY TRAINING. PHASE I. A GENERAL EXAMINATION OF THE TECHNOLOGY,
by Irving Meltzer, Harry Breindel and Samuel R. Sixbey. Aug 61, 223p. incl. illus. tables. 77 refs.
(Contract Nonr-61339)
(NAVTRADEVCEN TR 759-1)
Unclassified report

DESCRIPTORS: (*Military training, *Training, Amphibious operations, *Infrared equipment, *Training devices.) (Thermal targets, Identification, Target recognition, Position finding, Detection.) (Infrared radiation, Blackbody radiation, Absorption, Reflection, Wave transmission.) (Optical systems, Infrared optical systems, Optical materials, Optical equipment.) (Bolometers, Infrared image tubes, Infrared photoconductors, Phototubes, Infrared detectors, Electronic scanners, Television equipment, Infrared television, Systems.)

A study of infrared technology is presented as it is applicable to military training problems. It investigates particularly the specific problems of surveillance, the observation of nighttime amphibious training operations, and training in identification, interpretation, location, and detection of objects. Affirmative conclusions as to the feasibility of the application of infrared techniques to the training considerations of surveillance have been reached. It has also been concluded that television techniques are feasible for infrared image-forming in the range from 0.7 microns to 1.2 microns, as a means of infrared information distribution and display, and for image-forming at low intensity visible light levels. (Author)

24. PHOTOGRAPHY AND OTHER REPRODUCTION PROCESSES

AD-267 129 Div. 24, 22
(TISTW/JRG) OTS price $2.60

Link Div., General Precision, Inc., Palo Alto, Calif.
BALLISTIC CAMERA SYNCHRONIZATION AND CONTROL SYSTEM.
Progress rept. no. 5, 1-31 Aug 61.
31 Aug 61, 20p. incl. illus.
(Contract DA 30-069-ORD-3291)
Unclassified report

DESCRIPTORS: (*Ballistic cameras, Control systems, Synchronizers, Camera shutters, Timing circuits, Delay elements, Pulse generators, Time delay relays, Electric filters, Synchros, Design.) (*Optical tracking, *Cameras, Photographic equipment, Servo systems, Switching circuits, Design.)

In this continuing investigation, the Link Div. has received the electrical enclosure and the unit is partly wired. The circuits for the time-base generator, precision-delay circuit, pulse generator and 1 millisec delay, and camera shutter detector were designed. Block diagrams of these circuits are included. The camera shutter detector system is described in detail.

AD-267 530 Div. 24
(TISTW/JRG) OTS price $1.60

Link Div., General Precision, Inc., Palo Alto, Calif.
BALLISTIC CAMERA SYNCHRONIZATION AND CONTROL SYSTEM.
Progress rept. no. 7, 1-31 Oct 61.
15 Nov 61, 8p. illus.
(Contract DA 30-069-ORD-3291)
Unclassified report

DESCRIPTORS: (*Ballistic cameras, *Control systems, *Synchronizers, Timing circuits, Delay elements, Time delay relays, Pulse generators, Circuits.) (Cameras, Optical tracking.)

The time base generator, precision delay circuit, pulse generator, 1 msec delay, fine adjust mode, and synchronization logic were tested and found satisfactory. A new rack layout is included. Pictures of the first electrical enclosure are also presented.

AD-267 705 Div. 24, 22
(TISTW/JRG) OTS price $8.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CERTAIN METHODS OF STUDYING HIGH-SPEED PROCESS AND THEIR APPLICATION TO THE STUDY OF THE FORMATION OF A DETONATION WAVE (CHAPTERS I AND II), by G. D. Salamandre, T. V. Bazhenova and others. 2 Nov 61, 89p. incl. illus. tables (Trans. no. MCL-1350 of Nikotoryye Metody Issledovaniya Bystroprotekayushchikh Protsessov i Ikh Primeneniye k Izucheniyu Formirovaniya Detonatsionnoy Volny, Moskva, pp.5-57, 1960)
Unclassified report

DESCRIPTORS: (High speed cameras, *High speed photography, Schlieren photography, *Spark shadowgraph photography.) (Sparks, Electric discharges, Light, Sources, High speed photography.) (*Detonation waves, Pressure, Measurement.) (*Piezoelectric gages, Calibration, Design.) (Technological intelligence, Translations, USSR.) (Gases, Dynamics.)

AD-267 776 Div. 24, 12, 2
(TISTA/VGW) OTS price $6.60

Physical Research Lab., Boston U., Mass.
AN INVESTIGATION OF PHOTOGRAPHIC TECHNIQUES FOR THE RECORDING OF MISSILE FLIGHT.
Bi-monthly progress rept. no. 4, 16 Sep-15 Nov 56,
by W. R. J. Brown, F. D. Smith and others.
15 Nov 56, 59p. incl. illus. tables.
(Contract AF 04(645)60)
Unclassified report

DESCRIPTORS: (Guided missiles, Launching, Guided missile trajectories, Motion picture cameras, Motion picture photography, Effectiveness.) (Visibility of Guided missiles, Flight paths in *Photographic recording systems, Flight testing.) (Measurement of Sky brightness, Light, Attenuation, Polarization, Diffusion in Atmosphere, Climatic factors.) (Refractive properties of Atmosphere, Guided missiles.)

Aspects of missile contrast prediction were studied. Data for prediction are available. A preliminary analysis indicates that the object contrast will be high for most situations. Prediction of resolution loss in the atmosphere due to differential refraction (seeing) is further from completion than the other phases. A reliable upper limit to resolution loss was obtained which should prove useful in determining adequate photographic conditions for actual operations. Analysis of the micrometeorological variables yielded profiles of thermal turbulence for all the sites for a limited number of days. These profiles show that thermal turbulence decreases far more slowly with height than was previously assumed. A revised calibration procedure was developed for the thermal turbulence meter. A number of helicopter flights with a point source lamp were undertaken. An investigation was undertaken of the radiometric relationships that pertain to prediction of photographic contrast of an extended object against a sky background. (Author)

25. PHYSICS

AD-267 100 Div. 25
(TIPTM/EJH) OTS price $1.10

Texaco Experiment Inc., Richmond, Va.
KINETICS OF CONDENSATION FROM THE VAPOR PHASE.
Quarterly rept. for period ending 15 Oct 61,
by Welby G. Courtney and Wilbur Hall. 15 Oct 61, 6p. incl. table (Rept. no. TM-1295; EXP 328)
(Contract Nonr-314100)
Unclassified report

DESCRIPTORS: (*Vapors, *Water vapor, Fog, Gases, *Condensation, Drops, Ice, Particles, Pressure, Temperature, Low temperature research, Nucleation, Electric fields, Theory.) (Test equipment, Cloud chambers, Test methods.) Reaction kinetics.

Reproducibility of the critical supersaturation required for the condensation of water vapor was poor. A mild electric field and repeated expansions gave no improvement. The highest values of critical supersaturation as calculated by adiabatic expansion were considerably higher than values reported by other authors. (Author)

AD-267 103 Div. 25
(TISTP/JW) OTS price $4.60

Davidson Lab., Stevens Inst. of Tech., Hoboken, N. J.
FORWARD SPEED EFFECT ON LATERAL STABILITY DERIVATIVES OF A SHIP,
by Pung Nien Hu. Aug 61, 35p. illus. 14 refs. (Rept. no. 829)
(Contract Nonr-26333)
Unclassified report

DESCRIPTORS: (Integral equations, Green's function, Motion, Yaw.) (*Ship, Velocity, *Hydrodynamics, Stability (Lateral), Stability (Longitudinal), Guidance.) (*Ship hulls, Hydrodynamics.)

By use of Green's function, the problem of a thin surface ship moving at a constant forward speed and a small lateral speed (side slip or yaw) is formulated, leading to an integral equation for the doublet distribution. An iterative perturbation technique, based on the asymptotic expansion of the kernel function, is developed for the solution of the equation and is found very rapidly convergent. Lateral stability derivatives of a representative ship are evaluated and a strong Froude number dependence is detected. Comparison of the increase in lateral stability derivatives due to an increase of Froude number obtained from the theory with the available experimental result indicates good agreement. Qualitative analysis of the speed effect on the lateral stability indices and the steady-state turning radius is also made. (Author)

AD-267 119 Div. 25
(TISTP/MFA) OTS price $1.10

Ordnance Materials Research Office, Watertown, Mass.
EXCHANGE POLARIZATION AND THE MAGNETIC INTERACTIONS OF RARE EARTH IONS,
by R. E. Watson and A. J. Freeman. Feb 61, 7p. incl. illus. tables, 17 refs. (MRL Rept. no. 93)
(DA Proj. 5-93-32-001)
Unclassified report

DESCRIPTORS: (*Rare earths, Ions, *Magnetic fields, Hyperfine structure.) (Intermetallic compounds, Magnetic cores, *Polarization, Spin.) (Equations, Integrals.)

Study of the contribution of spin or exchange polarization to the magnetic interaction of a rare earth ion with its neighbors and with its own conduction electrons is presented. The rare earth ions carry a paired electron spin density which is negative in their outer reaches and these ions may even appear to their neighbors as as having negative spins (i.e. antiparallel to the 4f spin direction). Some experimental results are discussed on this basis. (Author)

AD-267 120 Div. 25, 33, 4
(TISTM/GEC) OTS price $8.10

Onondaga Associates, Inc., Lafayette, N. Y.
DEVELOPMENT OF FOAM INSULATION FOR PROTECTION OF ARCTIC AIRFIELDS.
Final rept.,
by A. R. Aidun, C. S. Grove, Jr. and K. E. Woodcock. Aug 61, 87p. incl. illus. tables, 11 refs. (Rept. no. OA-R2-FR63061)
(Contract AF 19(604)6635)
(AFCRL-827) Unclassified report

DESCRIPTORS: (*Foams, *Insulating materials for Ice, Landing fields in Arctic regions.) (Foams, *Protein solutions, *Glycerol ethers, *Detergents.) (Tests, Test methods, Stability, Thermal conductivity, *Thermal insulation, Tables, Physical properties, Low temperature research.)

Melting or thawing of ice on runways in the Arctic regions during summer months can cause soft spots or 'pot holes'. Many insulating materials are available, but the difficulties of application and/or transportation and the resultant increased cost preclude their use. A proprietary concept utilizing aqueous foam insulation was suggested. The use of aqueous foam has many advantages including ease of application and no need for removal. Airplanes can land on foam covered runways without difficulty. The stability and insulating properties of the foam were studied in detail. The problem of adequate generation of stabilized foam was considered in laboratory investigations and controlled larger scale tests. It can be concluded generally that aqueous foams give good insulation protection for ice surfaces under a large variety of conditions. (Author)

AD-267 123 Div. 25, 12
(TISTP/JW) OTS price $3.60

Space Technology Labs., Inc., Los Angeles, Calif.
AXIAL-SHEAR VIBRATIONS OF AN INFINITELY-LONG COMPOSITE CIRCULAR CYLINDER,
by J. H. Baltrukonis, W. G. Gottenberg, and R. N. Schreiner. Aug 60, 32p. incl. illus.
(Rept. nos. EM 10-16; STL/TR-60-0000-09265)
Unclassified report

DESCRIPTORS: (*Shear stresses, Motion, Vibration, *Cylindrical bodies.) (Guided missiles, Rocket motors, Design.) (Boundary layer, Polarization, Elasticity, Differential equations.)

Exact general solutions of the three-dimensional elasticity equations of motion in polar cylindrical coordinates are written for axisymmetric and anti-symmetric axial-shear vibrations. The frequency equation follows immediately from the

boundary conditions for the problem of the infinitely long, composite cylinder with two concentric circular-cylindrical layers which are perfectly bonded at their interface. The branches of the frequency equation are plotted and analyzed. The conditions are pointed out under which it is possible to obtain reasonably accurate estimates of the natural frequencies by assuming that the motions of the casing and core are uncoupled. (Author)

AD-267 126 Div. 25, 10
(TISTW/RD) OTS price $5.60

General Dynamics/Astronautics, San Diego, Calif.
HIGH TEMPERATURE INFRARED EMISSION AND ABSORPTION STUDIES.
Scientific rept. Jan-Aug 61,
by Carmine C. Ferriso. 14 Sep 61, 52p. incl. illus. (Rept. no. AE61-0910)
(Contract AF 19(604)5554)
(ARPA Order no. 116-60)
Unclassified report

DESCRIPTORS: (*Infrared radiation, Absorption, Gases, Exhaust gases.) (Rocket motors, Exhaust gases, Carbon dioxide, Tests.) (Jet flames, Exhaust flames, Temperature, Measurement.) (Infrared radiation, Absorption, Water vapor.) (Test equipment, Combustion chambers.) Infrared spectroscopy.

This report includes:
HIGH TEMPERATURE SPECTRAL ABSORPTION COEFFICIENTS OF THE 4.3 MICRON CO2 BAND, by Carmine C. Ferriso. 1961.
DESIGN AND OPERATION OF A RADIATION RESEARCH BURNER, by Robert A. Maraschin. 1961. (In cooperation with General Dynamics/Convair, San Diego, Calif.)

EXPERIMENTAL APPARATUS AND PRELIMINARY RESULTS FOR INFRARED STUDIES OF HOT H2O, by Carmine C. Ferriso and John A. Gracki. 1961.

AD-267 158 Div. 25, 14
(TISTM/GEC) OTS price $2.60

Oklahoma State U. Research Foundation, Stillwater.
OPTICAL AND ELECTRICAL PROPERTIES OF STANNIC OXIDE CRYSTALS.
Annual rept. 1 July 60-30 June 61,
by E. E. Kohnke. Sep 61, 26p. incl. illus. 25 refs.
(Contract Nonr-259501, Proj. NR 015-222/2-15-61)
Unclassified report

DESCRIPTORS: (*Crystals, *Tin compounds, *Oxides, Electrical conductance, Electrical properties, Stability, Temperature, Hall effect.) (Crystals, Solid state physics, Surface properties, Hydrolysis, Crystallization, Growth, Semiconductors, Impurities, Optics, Spectrophotometers, Electrical conductance, Polarographic analysis.) (Crystal holders, Design.)

A study was made of identifying the bulk properties of natural cassiterite crystals. Reproducible Hall coefficient data has been obtained. This allows calculation of the number of charge carriers taking part in the conduction process and their mobilities over an as yet restricted temperature range. A description of these measurements and work on charge carrier sign determination, and surface-to-bulk conductivity ratios are reported. Additional work on optical absorption with improved IR instrumentation is described. Emphasis was placed on the change in the nature of the 3 micron absorption under polarized light. Some conclusions are drawn about the conduction mechanism, charge carrier activation energies and effective mass values based upon the above data. An account of that portion of the surface studies program concerned with the relationships between the ''slow'' surface states and the surface potential is given. (Author)

AD-267 194 Div. 25
(TISTP/MFA) OTS price $2.60

Aerospace Corp., Los Angeles, Calif.
TRANSVERSE PINCH DYNAMICS,
by Richard H. Huddlestone. 1 Mar 61, 21p. incl. illus. (Rept. no. TDR-594(1214-01)TR-1)
(Contract AF 04(647)594)
Unclassified report

DESCRIPTORS: (*Plasma physics, *Magnetic pinch, Gas ionization, Particles, Elastic scattering.) (Wave transmission, Magnetic fields, Electric fields, Electric power production, Transmission lines.) (Equations, Integration.)

The dynamics of the initial phase of a nonadiabatic transverse pinch energized by a transmission line are studied in terms of a model for the plasma consisting of free particles colliding elastically with a moving interface. The initial temperature of the plasma as well as multiple collisions with the interface are neglected. It is shown that the pinching is well described by a simple approximation in which the nonlinear effects of changing pinch inductance and work done on the plasma are replaced by a constant effective load inductance. The accuracy of this approximation and the dependence of the dynamics on physical parameters are discussed. (Author)

AD-267 221 Div. 25, 27
(TISTA/LSK) OTS price $2.60

Allison Div., General Motors Corp., Indianapolis, Ind.
ANALYSIS OF ENERGY EFFICIENCY OF RAIL ACCELERATORS,
by George M. Palmer. July 61, 24p. incl. illus.
(Engineering Dept. rept. no. 2252)
(Contract AF 49(638)864, Proj. 9752)
(AFOSR-1631) Unclassified report

DESCRIPTORS: (*Ion accelerators, *Magnetohydrodynamics, *Electric propulsion, Ion rockets, Plasma oscillations, Plasma physics, Ions, Acceleration, Energy, Specific impulse, Effectiveness, Theory.)

Application of possible energy loss mechanisms to the rail accelerator problem has shown how large amounts of energy could be consumed and not become available as axial kinetic energy. Axial kinetic energy vs specific impulse plots indicate that a specific impulse of 10,000 sec would require a kinetic energy of 40 Joules. For the conditions considered, radial kinetic energy and the plasma formation and heat energy are negligible by comparison. Thus, an efficiency of 10 to 20% based on absorbed energy is implied depending upon emissivity up to a 50% reduction. The range of efficiency is in good agreement with experimental results. Two of the mechanisms considered, Joullian heating of the rails and radio frequency electromagnetic radiation, were found completely negligible. Although the relative

energy contained in radial motion at the velocities considered is small compared to the thermal radiation energy losses, a reduction in radial velocity has a corresponding effect on the radiation by reducing the radiating surface area for a given time interval. A marked improvement in efficiency could be realized by utilizing a cold plasma so that losses based on temperature could be reduced. (Author)

AD-267 224 Div. 25
(TISTP/MFA) OTS price $1.60

Illinois U., Urbana.
MOBILITY OF ELECTRONS IN SILVER CHLORIDE AT HIGH ELECTRIC FIELD,
by Taizo Masumi. Oct 61, 7p. illus. (Technical note no. 8)
(Contract AF 49(638)579)
(AFOSR-1706) Unclassified report

DESCRIPTORS: (*Photoconductivity, *Electrons, Chlorides, *Silver compounds, *Electric fields, Scattering.) (Crystals, Brillouin zones, Hall effect, Electron capture, Lattices.)

The theory of the polaron in ionic crystals usually applies to a slow electron in thermal equilibrium with the crystal lattice. As the electron gains energy from an electric field departing from thermal equilibrium, it is expected that the slow electron concept will begin to fail and, in addition, certain differences in electron scattering will take place. The mobility of electrons in AgCl under high electric field was investigated in order to clarify these points. (Author)

AD-267 259 Div. 25
(TISTM/GEC) OTS price $4.60

Office of Aerospace Research, Washington, D. C.
A SUMMARY VIEW OF THE AFOSR SOLID STATE SCIENCES PROGRAM.
Nov 61, 42p. incl. tables (Rept. no. OAR-3)
Unclassified report

DESCRIPTORS: (Tensile properties of Ceramic materials.) (Indium compounds, Antimony compounds.) (Beryllium, Tensile properties.) (*Solid state physics, Data storage systems, Documentation.) (Research program administration, Test facilities, Laboratories.) Electron microscopy, Crystal structure, Microwaves, *Scientific research, *Air force research, Explosive forming, Shock waves, Ruby, Masers.

Contents:
The AFOSR Solid State Program: Administrative aspects
Accomplishments of the AFOSR Solid State Effort
Field ion emission microscope
Ductile ceramics
Dynamic compression
The ruby maser
Indium antimonide
High-purity beryllium
Solid state information storage and retrieval
Research facilities

AD-267 278 Div. 25
(TISTP/MFA) OTS price $3.60

Laboratory for Insulation Research, Mass. Inst. of Tech., Cambridge.
TEMPERATURE DEPENDENCE OF THE DIELECTRIC CONSTANT OF IONIC CRYSTALS,
by Ronald Fuchs. Nov 61, 35p. incl. tables. (Technical rept. no. 167)
(Contracts AF 19(604)6155 and Nonr-184110)
Unclassified report

DESCRIPTORS: (*Crystals, *Ions, *Dielectrics, Thermal expansion, Polarization, Halides.) (Absorption, Infrared spectroscopy, Lattices, Energy, Temperature.) (Harmonic analysis, Vibration, Wave transmission.) (Partial differential equations, Integral equations, Matrix algebra, Perturbation theory.)

Two distinct physical processes contribute to the temperature dependence of the low-frequency dielectric constant: the effect of thermal expansion on ionic and electronic polarizabilities and density and a pure temperature effect with the volume held constant. The contributions from these processes can be determined from separate measurements of the temperature and pressure coefficients of the dielectric constant. The temperature coefficient at constant volume is due to both the anharmonic terms in the expansion of the lattic energy as a function of ionic displacements and the nonlinear dependence of the polarization on ionic displacements. It is possible to explain qualitatively why the temperature coefficient at constant volume changes from positive to negative as the dielectric constant increases. A correlation can be made between various temperature effects and the infrared absorption spectrum. (Author)

AD-267 282 Div. 25
(TISTP/GRW) OTS price $1.60

Naval Research Lab., Washington, D. C.
INELASTIC NEUTRON GAMMA ANGULAR CORRELATION FOR THE C12 (n,n' Gamma) C12 REACTION,
by R. B. Theus, L. A. Beach, and A. H. Aitken. 23 Oct 61, 12p. incl. illus. 14 refs. (NRL Rept. no. 5697)
(Proj. RR 002-06-41-5006)
Unclassified report

DESCRIPTORS: (*Inelastic scattering, Neutrons, Gamma rays, Neutron beams, Measurement.) Nuclear reactions.

The azimuthal correlation of inelastically scattered neutrons and gamma rays from 14-Mev neutrons on C-12 was measured. The resultant angular distribution was found to be isotropic for the inelastic neutrons and gamma rays scattered at right angles to the incident neutron beam. This distribution is compared with a plane-wave treatment of direct interaction theory and is found to be in disagreement. The theoretical angular dependency is dominated by a (cos 4 phi) term for the assumption of either extreme L-S or j-j coupling for the nuclear wave function. (Author)

AD-267 283 Div. 25
(TISTM/TCG) OTS price $1.60

Northwestern U., Evanston, Ill.
THE INTERACTION OF POINT DEFECTS AND DISLOCATIONS IN TERMS OF COLOR CENTER PHENOMENA,
by W. M. Hirthe and J. O. Brittain. 28 Nov 61, 7p. illus. 21 refs. (Technical rept. no. 3)
(Contract Nonr-122817, Proj. NR 032-464)
Unclassified report

Original contains color plates; all ASTIA reproductions will be in black and white. Original may be seen in ASTIA Hq.

DESCRIPTORS: (*Color centers, *Titanium compounds, *Dioxides, High temperature research, Creep, Deformation, Stresses, Shear stresses, Plastic flow, Plasticity, Theory.) (*Crystal structure, Lattices, Density, Diffusion, Resistance.)

As part of an investigation of the influence of point defects on the high temperature steady-state creep of TiO2, an interesting observation was made relating color centers and dislocations. During a series of high temperature creep experiments positive evidence for the interaction of point defects and dislocations was obtained. The positive evidence is the creation of color centers in the region undergoing plastic deformation. A short description of the observation together with the interpretation of color center phenomena from the literature is presented. (Author)

AD-267 294 Div. 25, 26
(TISTM/GEC) OTS price $1.60

Polytechnic Inst. of Brooklyn, N. Y.
THIN FILMS OF FERRIMAGNETIC OXIDES.
Progress rept. no. 12, 1 Apr-30 June 61, 30 June 61, 16p. incl. tables.
(Contract DA 36-039-sc-78107, Proj. 3-99-06-108)
Unclassified report

DESCRIPTORS: (*Ferromagnetic materials, *Ferrites, *Thin films, *Vapor plating, Production, High temperature research, Measurement, Diffusion pumps.) (*Metal films, Iron alloys and Nickel alloys, Yttrium compounds and Iron compounds and Garnet, Platinum, Gadolinium.) (Gadolinium compounds and Iron compounds and *Garnet, Magnetic properties, Surface properties.) Silicates, Aluminum compounds, Oxides, *Spinels.

Many facets of vacuum deposition technique relating to methods of production and measurement of thin films were studied. Flash evaporation of Yittrium-iron garnet powder, pt film contacts, and D.C. resistance of alloy films evaporated onto substrates of varying surface roughness have been studied along with methods for producing Gd and black Ni films. Microwave measurements are reported on Ni ferrite films and measurements at 2 frequencies on other Ni ferrite films. (Author)

AD-267 318 Div. 25, 2
(TISTP/MFA) OTS price $3.60

Honeywell Research Center, Hopkins, Minn.
THE OPTICAL AND ELECTRICAL PROPERTIES OF SINGLE CRYSTAL TELLURIUM.
Quarterly rept. no. 4 (Interim final rept.) for period ending 31 May 61.
31 May 61, 30p. incl. illus. tables (Serial no. 37037)
(Contract AF 49(638)908)
(AFOSR-1469) Unclassified report

DESCRIPTORS: (*Tellurium, *Crystals, Optics, Electrical properties, *Brillouin zones.) (Measurement, Experimental data, Absorption, Temperature, Hall effect.) (Lattices, *Crystal structure, Deformation.)

The results of measurements of twelve galvanomagnetic coefficients of tellurium as a function of temperature are presented. Based on these results, as well as the optical absorption measurements of the previous quarterly report, an energy band structure is postulated as the culmination of our first year's work on tellurium. This band structure differs from those previously proposed by Callen and Reitz, which are not in accord with the experimental data for our high-perfection crystals. (Author)

AD-267 319 Div. 25
(TISTP/JDP) OTS price $6.60

Honeywell Research Center, Hopkins, Minn.
THE OPTICAL AND ELECTRICAL PROPERTIES OF SINGLE CRYSTAL TELLURIUM.
Quarterly rept. no. 5, for period ending 31 Aug 61.
31 Aug 61, 68p. incl. illus. tables, 14 refs.
(Serial no. 37039)
(Contract AF 49(638)908)
(AFOSR-1470) Unclassified report

DESCRIPTORS: (*Single crystals, *Tellurium, Electrical properties, Optics.) (*Semiconductors, Resistance, Temperature, Impurities, Lattices, Crystal structure, Magnetic properties.)

In excess carrier studies, work on measurement of drift mobility is continuing. Lifetime measurements are being extended to antimony doped crystals. The previously reported optical absorption edge data is being fitted to an indirect absorption model. A report has been prepared on the application of group theory to band structure calculations, with special reference to tellurium. (Author)

AD-267 348 Div. 25
(TISTW/RD) OTS price $7.60

Research and Advanced Development Div., AVCO Corp., Wilmington, Mass.
RESEARCH ON AEROSOL SCATTERING IN THE INFRARED ATLAS OF SCATTERING DIAGRAMS FOR n = 1.33.
Technical rept.,
by Rudolf B. Penndorf. Oct 61, 71p. incl. illus. tables, 16 refs. (Rept. no. RAD-TR-61-32; Scientific rept. no. 5)
(Contract AF 19(604)5743)
(AFCRL-1044) Unclassified report

DESCRIPTORS: (Scattering of *Infrared radiation by Aerosols, Spheres.) (Infrared radiation, Intensity, Tables.)

Angular scattering diagrams are constructed for spherical aerosols of refractive index n = 1.33. They show the intensity function i sub 1 and i sub 2 as function of the scattering angle for size parameters alpha = 0.5 (0.5) 15. The basic data have been computed using Mie's theory and graphical interpolation techniques were used to fill the gaps. The diagrams presented in this atlas allow to determine the intensity functions i sub 1 and i sub 2 for any desired scattering angle with a high degree of reliability. (Author)

AD-267 361 Div. 25, 17
(TISTM/TCG) OTS price $1.60

Birmingham U. (Gt. Brit.).
PROPERTIES OF SEMICONDUCTING MATERIALS NEAR THE MELTING POINT AND IN THE LIQUID STATE.
Technical final rept.,
by G. F. Alfrey, R. V. Hodgson, and K. N. R. Taylor. 1 Aug 61, 17p. incl. illus.
(Contract DA 91-591-EUC-1503)
Unclassified report

DESCRIPTORS: (*Semiconducters, Materials, *Bismuth compounds, Selenides, Tellurides, Physical properties.) (Liquid metals, Single crystals, Crystallization, Specific heat, Transition temperature, Melting, Electrical properties, Electrical conductance, Thermoelectricity, Voltage.) (Intermetallic compounds, Solid state physics.)

A preliminary investigation of the physical properties of semiconducting materials at temperatures up to and above the melting point has been made. Bismuth telluride and selenide were considered to be particularly appropriate materials for examination. The linear expansion coefficient has been measured for the telluride in both the a and c directions, and for the selenide in the a direction. Published specific heat data have been examined and D.T.A. measurements made from room temperature to above the melting point in the telluride. All these measurements indicate some form of pre-melting phenomena occurring in this material over a temperature range of 50 C below the melting point. In addition, the expansion coefficient observations indicate an anomaly at lower temperatures (140 C for Bi2Te3 and approximately 0 C for Bi2Se3). (Author)

AD-267 389 Div. 25, 15
(TISTP/MFA) OTS price $4.60

Aeroelastic and Structures Research Lab., Mass. Inst. of Tech., Cambridge.
SOME CONSIDERATIONS ON STRESS FUNCTIONS,
by K. Washizu. Nov 61, 44p. incl. illus. tables (ASRL Rept. no. 1002; LL rept. no. 76G-0005)
(In cooperation with Lincoln Lab., Mass. Inst. of Tech., Lexington, Contract AF 19(604)7400)
Unclassified report

DESCRIPTORS: (*Stresses, Functions, Sheets, Structural shells, Prismatic bodies, *Deformation.) (Mathematical analysis, Equations, Partial differential equations, Integrals.)

Investigations into stress problems are presented: In Part I, stress functions in a three dimensional stress problem of the small displacement theory in rectangular Cartessian coordinates are discussed, and an application to a flat plate problem is shown. In Part II, stress functions in a three dimensional stress problem of the finite displacement theory in general curvilinear coordinates are shown to be derivable by the use of the vanishing conditions of Riemann-Christoffel curvature tensors and the principle of virtual work. It is obvious that the stress functions thus obtained include those of the small displacement theory as a special case. In Part III, the technique developed in Part II is applied to a shell problem of the small displacement theory, and stress functions for a thin shell are obtained. (Author)

AD-267 391 Div. 25, 15
(TISTP/MFA) OTS price $11.00

Radiation Lab., U. of Michigan, Ann Arbor.
STUDIES IN NON-LINEAR MODELING-III ON THE INTERACTION OF ELECTROMAGNETIC FIELDS WITH PLASMAS.
Final rept.,
by Kun-Mu Chen, R. E. Kleinman and others.
31 July 61, 145p. (Rept. no. 4134-2-F)
(Contract AF 19(604)7428)
(AFCRL 746; ARPA Order no. 147-60)
Unclassified report

DESCRIPTORS: (*Plasma physics, *Electromagnetic fields, Nonlinear systems, Gas ionization, Sheets.) (Electromagnetic waves, Attenuation, Electrical conductance.) (Quantum mechanics, Perturbation theory, Functional analysis, Bessel functions, Transformations (Mathematics).) (Partial differential equations, Experimental data, Tables.)

Results of an investigation of the interaction of electromagnetic fields with plasmas, including the development and use of appropriate non-linear modeling techniques, are presented. Expressions for density distributions in the sheath and potential induced on a conducting plate in the presence of a plasma (moving or stationary) are found. The potential at one temperature in the sheath is non-linearly modeled to give the potential at another temperature. Correction terms are found for the standard treatments of the interaction of electromagnetic fields with collisionless plasmas and weakly ionized gases. These corrections are functions of field intensity and give significant results for high intensity fields. The current induced in the plasma with a low intensity field is non-linearly modeled to the high intensity case. Expressions for the conductivity (both a.c. and d.c.) are found for various plasmas and incident field intensities. (Author)

AD-267 423 Div. 25
(TISTP/JW) OTS price $3.60

Radiation Lab., Johns Hopkins U., Baltimore, Md.
RELAXATION PHENOMENA IN DILUTE POTASSIUM FERRICYANIDE. PART I. EXPERIMENTAL TECHNIQUES FOR THE MEASUREMENT OF RELAXATION TIMES BY THE SATURATION-RECOVERY METHOD,
by T. M. Bray, G. C. Brown, Jr. and A. Kiel.
Nov 61, 33p. incl. illus. (Technical rept. no. AF-90)
(Contract AF 33(616)6753)
Unclassified report

DESCRIPTORS: (*Potassium compounds, Iron compounds, Cyanides, *Resonance, Relaxation time, Paramagnetic crystals, *Paramagnetic resonance.) (Test equipment, Electronic circuits.) (Microwaves, Measurement, Test methods.)

A brief physical description of the theory and measurement of the relaxation phenomena involved in parametric resonance is given. This report presents a complete detailed description of the saturation-recovery method (also referred to as the pulse saturation method), the experimental set-up, including the electronic circuitry, and the techniques developed during the study of parametric relaxation phenomena.

AD-267 455 Div. 25, 14
(TISTM/REB) OTS price $1.10

Carborundum Co., Niagara Falls, N. Y.
A STUDY OF FUNDAMENTAL MECHANICAL PROPERTIES OF CERAMIC SINGLE CRYSTALS.
Bi-monthly rept. no. 3, 12 Sep-11 Nov 61,
by H. Dean Batha and Richard M. Drake. 29 Nov 61, 6p. incl. illus.
(Contract NOw-61-0676-c)
Unclassified report

DESCRIPTORS: (*Ceramic materials, *Silicon compounds, *Carbides, *Single crystals, Chemical impurities, Boron, Growth, Mechanical properties, High temperature research.) (Solids, Solutions.) Test equipment.

All of the components for the three-point bending apparatus have been received and assembly is nearly complete. Portions of the apparatus have been satisfactorily tested. Crystals of relatively pure silicon carbide, as well as crystals with boron in solid solution with the silicon carbide, have been selected and additional crystals will be grown as required. (Author)

AD-267 458 Div. 25
(TISTM/TCG) OTS price $9.10

General Mills, Inc., Minneapolis, Minn.
SPUTTERING YIELDS.
Annual rept., 1 Nov 60-31 Oct 61,
by G. K. Wehner, R. V. Stuart, and D. Rosenberg.
Nov 61, 97p. incl. illus. tables, 83 refs.
(Rept. no. 2243)
(Contract Nonr-158915, Proj. 85037)
Unclassified report

DESCRIPTORS: (*Ion bombardment, Argon, Neon, Helium, Krypton, Xenon, Ions, Mercury, *Metals, Metal films.) (Gas discharges, Gas ionization, Erosion, *Plasma physics, Mass spectroscopy.) Satellite vehicles, Radiation damage.

This report includes:
PHYSICAL SPUTTERING, by G. K. Wehner, 1961.

SPUTTERING YIELDS OF METALS FOR Ar(+) AND Ne(+) IONS WITH ENERGIES FROM 50 TO 600 EV,
by Nils Laegreid and G. K. Wehner. 24 Aug 60.
(Work was partly supported by Office of Naval Research and Air Force Cambridge Research Center contracts; Reprint from Jnl. of Applied Physics 32:365-369, Mar 61)

SPUTTERING YIELDS FOR LOW ENERGY He(+)- AND Xe(+)-ION BOMBARDMENT,
by D. Rosenberg and G. K. Wehner.

SPUTTERING AT VERY LOW ION ENERGIES,
by Robley V. Stuart and G. K. Wehner. 1960.
(Reprint from 1960 Seventh National Symposium on Vacuum Technology Transactions) (Work is partly sponsored by AFCRC and ONR contracts)

SPUTTERING YIELDS AT VERY LOW BOMBARDING ION ENERGIES,
by R. V. Stuart and G. K. Wehner. 1961. (Sponsored by Office of Naval Research)

DEPENDENCE OF SPUTTERING YIELDS ON TARGET TEMPERATURE. 1961.

AD-267 462 Div. 25
(TISTM/GEL) OTS price $1.60

Institute for Molecular Physics, U. of Maryland, College Park.
POTENTIAL ENERGY CURVES FOR C2,
by Shirley M. Read and Joseph T. Vanderslice.
27 Nov 61, 14p. incl. illus. tables, 29 refs.
(Technical rept. no. 3)
(Contract Nonr-59514, Proj. NR 051-425)
Unclassified report

DESCRIPTORS: (Nuclear energy levels, Nuclear states, Energy, *Carbon, Molecules, Atoms, Vibration, Rotation, Dissociation, Quantum mechanics, Electric potential.)

Potential energy curves for several electronic states of C2 were calculated by the Rydberg - Klein - Rees method. These curves were compared with some recent quantum calculations of Clementi and Pitzer on this same system. The recent identification of the ground state by Ballik and Ramsay (J. Chem. Phys. 31:1128, 1959) and the determination of the dissociation energy by Brewer, Hicks and Krikorian (J. Chem. Phys. 33:0000, 1961) were used to calculate tentative values for the dissociation energies of all observed excited electronic states. (Author)

AD-267 508 Div. 25
(TISTP/MFA) OTS price $2.60

Cornell U., Ithaca, N. Y.
A GAS ABSORPTION CELL IN THE SOFT X RAY REGION,
by David Ederer. Oct 61, 25p. incl. illus. tables (Technical rept. no. 6)
(Contract Nonr-40137, Proj. NR 017-625)
Unclassified report

DESCRIPTORS: (*Absorption, *Gases, *X rays, Fluoroscopes, Fluorescence, Attenuation, *Phototubes, Diffraction gratings, Photomultipliers, X-ray spectrometers, Transparent panels.) (X-ray diffraction analysis, Experimental data, Tables.) (Equations, Integration.)

In measuring absorption cross sections of gases in the soft x ray region, the use of a gas cell has several advantages over the more conventional procedure in which the absorbing gas sample is allowed to fill the entire spectrograph. When a cell is used the absorbing path is only of the order of a few centimeters, and higher gas pressures of the order of 1-3 mm of Hg can be maintained within the cell. This feature makes it possible to control and measure the pressure accurately, confining the gas to a closed region so that the absorbing gas does not interfere with the operation of source or electronic detectors which require a high vacuum. In addition in the cell, the partial pressure due to any contaminating vapor is smaller by several orders of magnitude since pressures of the order of 1/1000 mm of Hg are required when the spectrograph is filled with gas. Moreover oil vapors or other products of outgassing are prevented from polluting the sample under study. (Author)

AD-267 514 Div. 25, 7
(TISTM/TCG) OTS price $4.60

Clevite Corp., Cleveland, Ohio.
RESEARCH ON ANTIFERROELECTRIC MATERIALS.
Quarterly progress rept. no. 1, 1 July-30 Sep 61,
by Bernard Jaffe. 20 Oct 61, 19p. illus. tables.
(Contract DA 33-019-ORD-3686, Proj. 30249-G)
Unclassified report

DESCRIPTORS: (*Capacitors, Materials without *Ferroelectricity for Energy, Storage, Ceramic materials, Dielectric properties, Phase studies, Phase transitions, Hysteresis, Measurement.) (Lanthanum compounds, Lead compounds, Stannates, Titanates, Zirconates, Oxides.)

Research was conducted on antiferroelectric materials to develop a capacitor material superior to existing ceramic and film materials in energy storage per unit volume. Experiments are described on ceramic compositions that have field-enforced antiferroelectric to ferroelectric transformations resulting in double hysteresis loops with a linear central region. Several examples are shown of compositions that have this type of loop over a wide temperature range. Experiments with very low $PbSnO_3$ contents improved the morphotropy of the phase boundary but the resulting compositions showed large threshold field at and below room temperature. Work will continue to employ compositional variation to try to improve further the character and temperature dependence of the hysteresis loops. (Author)

AD-267 528 Div. 25
(TISTP/MFA) OTS price $8.60

Weizmann Inst. (Israel).
OPTICAL DISPERSION OF GASES IN THE INFRARED REGION. THE DISPERSION THROUGH THE FIRST OVER-

TONE BAND OF HCl,
by Salo Kimel. Nov 60, 92p. incl. illus. tables.
(Technical scientific note no. 4)
(Contract AF 61(052)57)
(AFCRL-277) Unclassified report

DESCRIPTORS: (*Infrared research, *Optics, *Gases, *Refractive index, Frequency, Absorption.) (Resonance, Electric fields, Electromagnetic waves, Magnetic fields.) (Polarization, Vibration, Measurement.) (Refractometers, Interferometers, Monochromatic light.) (Experimental data, Tables, Groups (Mathematics), Differential equations.)

A detailed account is given of the theory of optical dispersion of gases. Measurements using a hollow prism refractometer for the infrared region are described. Dispersion through individual lines of the HCl 2-0 band are measured and the absolute line strengths calculated. (Author)

AD-267 593 Div. 25
(TISTP/MFA) OTS price $4.60

Cornell U., Ithaca, N. Y.
PULSED NUCLEAR MAGNETIC RESONANCE IN ALKTI HALIDES.
by W. G. Clark. June 61, 134p. incl. illus.
(Technical rept. no. 5)
(Contract Nonr-40115)
Unclassified report

DESCRIPTORS: (*Nuclear magnetic resonance, Nuclear spins, *Halides, *Alkali metal compounds, Crystals, Diffusion, Relaxation time, Half life, Lattices, Crystal structure, Deformation, Instrumentation.) (Measurement, Experimental data, Temperature.) Combinatorial analysis.

Free induction decay and quadrupolar echo shapes showing the dependence of quadrupolar broadening on the orientation of the crystal relative to the external magnetic field were measured. In all substances studied, quadrupolar broadening disappears at high temperatures. The disappearance is interpreted as arising from the annealing of dislocations, which reappear when the crystal is cooled to room temperature. At temperatures on the order of 600 K diffusion increases the free induction decay lifetimes; at still higher temperatures, free induction decay lifetimes decrease. This decrease is tentatively ascribed to quadrupolar broadening by vacancies. Calculations of the effects of diffusion on the quadrupolar part of free induction decay and echo shapes are presented. These calculations show that diffusion will slow the decay of the quadrupolar part of a free induction decay and attenuate, broaden, and delay the appearance of a quadrupolar echo. A method for the separate measurement transitions in a spin 3/2 system subject to quadrupolar relaxation but not a spin temperature constraint is proposed. The spin echo apparatus used for the experiments is described in detail. (Author)

AD-267 605 Div. 25
(TISTP/WH) OTS price $3.60

Instrumentation Lab., Mass. Inst. of Tech., Cambridge.
THE TRANSFER OF HEAT FROM GIMBALED STRUCTURES BY CONDUCTION,
by Richard M. Jansson. 25 Oct 60, 27p. incl. illus. tables (Rept. no. E-966)
(Contract AF 04(647)303)
Unclassified report

DESCRIPTORS: (*Heat transfer, *Gimbals, Structures, Theory, Experimental data.) (*Thermal conductivity, Ball bearings, Lubricants, Test methods.)

Methods of transferring heat from an enclosed gimbal to the enclosure in which it is mounted are described. The tests from which data was obtained were made using simplified structures to simulate the heat-transfer mechanisms of interest. Theoretical and experimental data is given, showing that a specially constructed gas-conduction gap between an inner gimbal and its enclosure will provide a considerable increase in the flow of heat. The use of conductive lubricants in a gimbal bearing is also shown to result in higher heat-transfer characteristics. The test results illustrate only the general significance of the heat-transfer methods and the approximate magnitudes of heat transfer applicable to gimbal systems. (Author)

AD-267 627 Div. 25
(TISTM/TCG) OTS price $1.60

McMurry Coll., Abilene, Tex.
THE DIELECTRIC COEFFICIENTS OF QUARTZ,
by Charles A. Adams and Virgil E. Bottom.
30 Nov 61, 13p. incl. illus. (Scientific rept. no. 1)
Unclassified report

DESCRIPTORS: (*Quartz, Sheets, Quartz capacitors, Quartz crystals, Aluminum, Films, Dielectric properties, Capacitors, Glass, Capacitance bridges, Measurement, Metals, Electrodes.)

The dielectric coefficients of quartz were determined by measuring the capacitance per unit area of a parallel plate capacitor made by depositing metallic electrodes directly on the surfaces of large thin plates of quartz. Corrections were made for the finite size of the plates by an empirical formula which gave excellent results with large sheets of glass. Measurements were made on Z-cut and Y-cut plates using a General Radio 716C Capacitance Bridge at a frequency of 100 kc/sec. The results obtained on the specimens studied are K (parallel) equals 4.71 and K (perpendicular) equals 4.58. Results are believed to be accurate to ± 0.5%. It is not known how much variation exists from specimen to specimen of quartz, but it is unlikely that measurements made to this accuracy would be affected by crystalline imperfections. (Author)

AD-267 634 Div. 25, 30
(TISTA/LSK) OTS price $3.60

Space Technology Labs., Inc., Los Angeles, Calif.
SHOCK CHARACTERISTICS OF NONLINEAR SYSTEMS.
Final rept.,
by R. J. Savage and M. V. Barton. 31 Dec 60, 37p. incl. illus. tables (Rept. no. STL/TR-60-0000-19426)
(Contract AF 04(647)619)
(AFBMD TR 61-8) Unclassified report

DESCRIPTORS: *Nonlinear systems, Vibration isolators, *Shock resistance, Test equipment, Theory.

The exploitation of nonlinear devices for protection of equipment from shock, and measurements of responses to shock were made on a series of nonlinear models with softening spring characteristics (yielding and elastic specimens). For the

yielding specimens, a special holding fixture was designed which, in conjunction with a shock loading device, ensured that the specimens would be subjected to twisting forces only. These specimens were subjected to increasing levels of half sinusoid dynamic torque pulses until yielding occurred. The extent of plastic range investigation was sufficient to produce a reduction of mass response acceleration of 50%, compared to the response acceleration of an equivalent linear system subjected to the same shock. Elastic specimens were also subjected to increasing levels of half sine acceleration pulses and similar comparisons are made. Response information is tabulated and curves are presented which show the acceleration or force limiting capabilities of the models tested. Also shown are the acceleration responses of associated linear systems subjected to the same shocks. The level of shock suppression, expressed as the acceleration reduction coefficient, is tabulated for these cases. Elastic and plastic deflections for yielding specimens for a given input pulse are shown and indicate minimum levels of acceleration necessary to cause plastic motion to commence. (Author)

AD-267 655 Div. 25, 14
(TISTP/JDP) OTS price $5.60

Naval Ordnance Lab., White Oak, Md.
METHOD OF MEASURING THERMAL DIFFUSIVITY AND SPECIFIC HEAT OF AN ABLATING BODY,
by J. M. Kendall. 11 July 61, 25p. incl. illus.
(Aeroballistic research rept. no. 23)
(NAVORD rept. no. 5771)
Unclassified report

DESCRIPTORS: (Measurement, *Thermal diffusion, *Specific heat, Solids, Ablation.) (*Plastics, *Thermal conductivity, Thermal diffusion, Determination, Laminates, Laminated glass, Cutting torch, Acetylenes.) (Materials, Thermodynamics.)

A method is presented for measuring thermal properties of a material as functions of temperature. The heat capacity per unit volume is determined by measuring the temperature rise of an adiabatically heated sample. Adiabatic conditions are produced by employing uniformly distributed heat sources in a model composed of the material. Thermal conductivity and thermal diffusivity are determined by combining results of this measurement with an ablation test on a bar of the material. An oxyacetylene torch was found capable of producing a rate of ablation of 0.02 cm/sec for a melamine-bound glass-cloth laminate. A one-dimensional steady-state thermal layer is soon established. A method is also described for obtaining an effective value of the thermal diffusivity from the ablation test alone. (Author)

AD-267 656 Div. 25
(TISTP/JDP) OTS price $5.60

Naval Ordnance Lab., White Oak, Md.
THE DESIGN AND PERFORMANCE OF PRECISION OIL MICROMANOMETERS,
by J. M. Kendall. 29 June 61, 55p. incl. illus.
(Aeroballistic research rept. no. 88)
(NAVORD Rept. no. 6803)
Unclassified report

DESCRIPTORS: (*Micromanometers, Design, Tests, Oils, Silicon.) (*Transducers, Pressure, Calibration, Low pressure research, Micromanometers.)

The micromanometers developed consist of a glass U-tube, a fluid reservoir, an optical system capable of reading the meniscus position with an accuracy of a hundredth of a millimeter, and a means of read out. The fluid found to be most suitable is the ten centistokes viscosity silicone oil, which is perfectly clear, very stable chemically, and has low vapor pressure and low kinematic viscosity. The use of this fluid instead of mercury increases the sensitivity by a factor of about 15. These micromanometers are generally accurate to about one micron Hg, or 0.1 percent, whichever is greater. The maximum practical range is about 50 mm Hg. A method for producing pressure differences of a few microns Hg which makes use of a heated air column is described for checking the accuracy of micromanometers at very low pressures. The application of the micromanometer in making measurements of small volumes such as those associated with pressure transducers and valves is described. Some detailed suggestions for the practical use of micromanometers are given. (Author)

AD-267 668 Div. 25
(TISTP/JDP) OTS price $5.60

Ordnance Materials Research Office, Watertown, Mass.
THEORY OF DIRECT EXCHANGE IN FERROMAGNETISM,
by A. J. Freeman and R. E. Watson. July 61, 52p. incl. illus. tables (MRL rept. no. 104)
(Proj. TB4-001)
Unclassified report

DESCRIPTORS: (Metals, Iron, *Ferromagnetism, Molecular structure, *Atomic orbitals, Atomic structure, Quantum mechanics, Integrals.)

An investigation is presented on the role of direct exchange as the mechanism responsible for ferromagnetism. The direct exchange integral J is considered for two cases for which J is rigorously defined: (1) A pair of atoms with a single electron per atom, and (2) a single hole in otherwise shells. The direct exchange parameter J is found to be large and negative for the two electron case and negative, but smaller, for the two holes case, whereas for ferromagnetism it should be positive. From this it is concluded that either the direct exchange mechanism is not the dominant source of the ferromagnetism of the transition metals or that the direct exchange model is an inappropriate description of their magnetic behavior. A more exact model of direct exchange is discussed, as are some of the problems inherent in carrying it out. (Author)

AD-267 704 Div. 25
(TISTP/JW) OTS price $3.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THERMAL STRESSES IN A SPHERICAL AND CYLINDRICAL SHELL IN THE CASE OF MATERIAL PROPERTIES DEPENDING ON THE TEMPERATURE,
by Marek Sokolowski. 19 Sep 61, 36p. incl. illus. (Trans. no. MCL-1104 of Rozprawy Inzynierski CLXIX 8:641-667, 1960)
Unclassified report

DESCRIPTORS: (*Thermal stresses, Cylindrical bodies, Spheres, Elastic shells.) (*Thermoconductivity, Surfaces, Temperature, Heat exchangers.) (USSR, Translations.) (Elasticity, Materials, Physical properties.)

The analysis covers the problems of thermal elasticity with reference to stresses occuring in the walls of a pipe (cylindrical shell) or hollow sphere (spherical shell) when their internal and external surfaces are heated to different temperatures. The effect is considered of thermal stresses on the distribution when the physical properties of materials undergo certain changes with temperature. In particular, this applies to thermoconductivity.

AD-267 712 Div. 25
(TISTP/JVP) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A METHOD FOR AERIAL SURVEYING OF RADIOACTIVE ELEMENTS,
by V. A. Ionov, N. D. Balyasnyy and others. 21 Nov 61, 3p. (Trans. no. FTD-TT-61-213 of Buylleten' Izobreteniy, No. 22, Patent no. 133538:25-28, 1960)
Unclassified report

DESCRIPTORS: (*Labeled substances, *Radioactive isotopes, Rock, *Geophysical properties Aerial reconnaissance, Radiographic analysis, Gamma ray spectra, Scintillation counters, Data processing systems, Airborne.) (Radium, Thorium, Potassium.) (Translations, USSR.)

A method is described for the aerial surveying of radioactive elements from a gamma-radiation spectrum, using a scintillation counter and a multi-channel amplitude analyzer, and devices for deduction of the background and corrections for flight altitude. To increase the accuracy in determining the radioactive element content in a near-surface rock layer and automatically process the data during the flight, the measurements are made within a restricted solid angle, analyzing the spectrum by means of the narrow differential channels of the amplitude analyzer located at the sites of the characteristic lines of the gamma-spectrum of the respective elements. (Author)

AD-267 718 Div. 25, 4
(TISTM/TCG) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RATE OF CONTACT FUSION OF ALKALI METAL-HALIDE CRYSTALS,
by P. A. Savintsev, V. Ye. Avericheva, and M. V. Kostyukevich. 13 Nov 61, 6p. incl. illus. tables (Trans. no. FTD-TT-61-66 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika no. 4:107-109, 1960)
Unclassified report

DESCRIPTORS: (*Alkali metal compounds, *Halides, Crystals, Sodium compounds, Chlorides, Bromides, Potassium compounds, Iodides, Melting, Sintering, *Diffusion, Liquids, Solids, Solutions, Solubility, Phase transitions, Measurement.) USSR, Translations, Technological intelligence.

The rate of contact fusion of alkali metal-halide crystals NaCl-KI, KI-KCl, and KI-NaBr was related to temperature by the exponential law. The powder salts were pressed into tablets. One tablet was placed in a crucible in a furnace, and the other sample was suspended just above the sample in the crucible. During the heating and at a predetermined temperature, the suspended sample was brought in contact with the lower sample. The rate of contact fusion was recorded on a thermogram. Melts obtained from contact fusion of KI-NaBr crystals at different temperatures had similar compositions.

AD-267 722 Div. 25
(TISTE/CDM) OTS price $8.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ELECTROHYDRAULIC EFFECT (Elektrogidravlicheskiy Effekt),
by L. A. Yutkin. 13 Oct 61, 87p. incl. illus. tables (Trans. no. MCL-1207 of Gosudarstvennoye Nauchno-Tekhnicheskoye Izdatel'stvo Mashinostroitel'noy Literatury Moskva, Leningrad, pp. 1-51, 1955)
Unclassified report

DESCRIPTORS: (USSR, Technological intelligence, *Magnetohydrodynamics, *Plasma physics.) (*Electric discharges, Liquids, Dielectrics, Ionization, Shock waves, Pressure.)

A short description is given of the phenomena accompanying a high-voltage discharge in a liquid. This phenomenon (called the electrohydraulic effect by the author) consists of the fact that, when a specially shaped electric pulse discharge is produced inside a liquid, extremely high pressures arise in the neighborhood of the discharge. These high pressures manifest themselves in extremely different ways, as in mechanical destruction of objects in the neighborhood of the discharge, ejection of liquid, etc. It was possible to establish experimentally the existence of certain laws regarding the nature and results of this phenomenon. The possibilities of using this phenomenon for practical purposes were determined in a general form. A short description of the electrohydraulic effect, the method of study, and the results, as well as discussions on its prospective use are presented. (Author)

AD-267 728 Div. 25, 15
(TISTP/MFA) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
RADIATION OF A CHARGED PARTICLE IN A MEDIUM WITH A PERIODICALLY VARYING DENSITY,
by A. Ts. Amatuni and N. A. Korkhmazyan. 17 Nov 61, 13p. (Trans. no. FTD-TT-61-115 of Izvestiya Akademii Nauk Armyanskoy SSSR, Seriya Fiziko-Matematicheskikh Nauk 13:55-64, 1960)
Unclassified report

DESCRIPTORS: (*Particles, Dielectrics, Energy, *Cerenkov radiation, Magnetic fields.) (Lattices, Diffraction gratings, Harmonic analysis.) (Differential equations, Integration, Fourier analysis.)

Losses of a charged particle in a medium with a periodically varying density (and consequently a periodically varying dielectric constant) have been previously investigated. The energy losses by a particle to Cerenkov radiation are examined by a different method. (Author)

AD-267 737 Div. 25, 17
(TISTM/GEC) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THERMODYNAMICS OF ZIRCONIUM AND HAFNIUM CHLORIDES,
by L. P. Ruzinov and S. F. Belov. 27 Oct 61, 14p. incl. illus. tables, 25 refs. (Trans. no. FTD-TT-61-75 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Tsvetnaya Metallurgiya 6:104-113, 1960)
Unclassified report

DESCRIPTORS: (*Chlorides, *Zirconium compounds, *Hafnium compounds, Rare earth compounds, Separation, Ores, Thermodynamics, *Thermochemistry, Entropy.) (Technological intelligence, Translations, USSR.)

A study was made of the complexity of processing and separation into elements of Zr-Hf due to their closeness in properties and their polyvalency. The thermodynamic probability of individual processes was studied and the thermochemical constants (heat content, entropy, heat capacity) needed for the thermodynamic calculations of certain chlorides of Zr and Hf were determined. (Author)

AD-267 738 Div. 25
(TISTE/CRJ) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
AN INVESTIGATION OF HIGH-FREQUENCY DISCHARGE IN THE BAND FROM 1.5 TO 15 MC III,
by A. A. Kuzovanikov and N. A. Kaptsov.
13 Nov 61, 12p. incl. table, 16 refs. (Trans. no. FTD-TT-61-94 of Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika 6:64-70, 1960)
Unclassified report

DESCRIPTORS: (*Electrical corona, *Electric discharges, High frequency, Theory.) (*Plasma physics, Electric arcs, Theory.) (Translations, USSR, Technological intelligence.)

The mechanism of the development of steady high-frequency corona discharge and an explanation of its change into torch discharge are presented. The mechanism of the development of high-frequency corona discharge can be explained on the basis of avalanch-streamer theory when the development of torch discharge occurs as a result of the gradual formation of high-frequency plasma, in the space occupied by the torch, during many field cycles. High-frequency corona discharge changes to torch discharge at frequencies where the active duration of the voltage half-cycle is less than 0.3 microsecond, the time necessary for streamer formation. (Author)

AD-267 742 Div. 25, 30
(TISTP/WH) OTS price $3.60

Kiruna Geophysical Observatory (Sweden).
AN AUTOMATIC DIGITAL RECORDING AND REDUCING SYSTEM FOR GEOMAGNETIC STANDARD DATA,
by B. Hultqvist, A. Thunberg and others.
27 Jan 61, 18p. illus. (Scientific rept. no. 2)
(Contract AF 61(052)237)
(AFCRL-490) Unclassified report

DESCRIPTORS: (*Terrestrial magnetism, Geophysics, Data, Digital systems, Recording systems, *Data processing systems, Transducers.)

An automatic digital data recording and reduction system for geomagnetic standard observations is described. The system is designed for only one component of the geomagnetic field, but it is planned to extend it to three components. The system collects automatically all data necessary for reduction of the magnetovariograph values on punched tape. The reduction is done by a computer which computes and prints all tables of the yearly data publication. (Author)

AD-267 750 Div. 25, 2
(TISTP/MFA) OTS price $2.60

Ramo-Wooldridge Corp., Los Angeles, Calif.
A MODEL FOR THE PHYSICS OF PHOTOFLASH CLOUD EXPLOSIONS,
by J. S. Margolis. 12 Sep 57, 20p. incl. table.
(Rept. no. GM-TN-76)
(Contract AF 18(600)1190)
Unclassified report

DESCRIPTORS: (Ballistic cameras, *Photoflash cartridges, Electromagnetic waves, *Explosions, *Guided missiles, Guided missile trajectories, Surface to surface, Telemetering.) (Gas flow, Thermodynamics, Hydrodynamics.) (Continuum mechanics, Infrared spectroscopy, Infrared radiation, Scattering, Absorption, Alkali metals, Thermionic emission.) (*Astrophysics, Quantum mechanics.)

A qualitatively simple model is described for the analysis of an expanding incandescent gas ball. Radiative energy transfer from the cloud can be expected to seriously modify the flow from that predicted by an adiabatic expansion. The central region of the cloud is in a state of near-thermodynamic equilibrium; the second region is complex because of its deviation from equilibrium conditions and can be described simply as intermediate to the first and third regions; the third region is characterized by the slowness of energy exchange between the kinetic and electronic degrees of freedom. There is a very large deviation from thermal equilibrium in the third region. The free electron density in the central region is well represented by the Saha equation, which becomes increasingly less accurate as the edge of the cloud is approached; it should, however, hold to the outer layer. The analysis of the continuum radiation from the gas shows that this radiation is intimately connected with the ionization. Reduction of the free electrons in the cloud for the purpose of facilitating telemetry, would also considerably reduce the continuum radiation. (Author)

AD-267 765 Div. 25, 14
(TISTM/TCG) OTS price $1.60

Textile Research Inst., Princeton, N. J.
MOLECULAR CONFORMATION IN UNORIENTED CRYSTALLINE POLYMERS,
by A. V. Tobolsky and V. D. Gupta. Sep 61, 10p.
(Technical rept. no. 24)
(Contracts Nonr-09000 and Nonr-09001)
Unclassified report

DESCRIPTORS: (*Polymers, Crystals, Crystal structure, *Molecular structure, Crystallization, Plasticity by Mathematical analysis, Probability, Theory, Vector analysis.)

A molecular model for completely unoriented polymer chains which can be formed on a square lattice is presented. Using the mathematical methods of the Markoff formalism, expressions for the dimensions of the molecular chain, values for the per cent crystallinity and sequence length in amorphous and crystalline regions are derived in terms of two probability parameters. The problem of excluded volume is not considered. (Author)

AD-267 775 Div. 25
(TISTP/MFA) OTS price $11.00

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
THESES REPORTS AND PAPERS AT THE CONFERENCE ON HEAT AND MASS TRANSFER (Tezisy Dokladov i Soobshcheniy na Soveshchanii po Teplo- I Massoobmenu (Minsk, 5-9 June 1961)).

16 Nov 61, 140p. (Trans. no. MCL-1407 of Akademiya Nauk Belorusskoy SSSR Ministerstvo Vysshego i Srdenego Spetsial'nogo Obrazovaniya SSSR, Akademiya Stroitel'stva i Apkhitektury SSSR, Institut Mekhaniki an SSSR, Energeticheskiy Institut im G. M. Krzhizhanovskogo, Minsk, pp. 1-100, 1961)
Unclassified report

DESCRIPTORS: (*Heat transfer, Scientific reports, Theses, Conferences.) (Particles, Thermal radiation, Thermal diffusion, Perturbation theory, Differential equations.) (Heat treatment, Convection, Heat exchangers.) (Reactor fuels, Water boiler reactors, Gas flow, Fluid mechanics, Axially symmetric flow, Rare gases, Infrared radiation.) (Liquids, Boiling, Gas diffusion.) (Chemical engineering, Aerodynamics, Combustion, Heat transfer, Hydrodynamics, Thermodynamics.) (High temperature research, Ceramic materials, Physical properties, Processing, Construction, Design.) (Thermal conductivity, Chemical reactions, Polymerization, Metals.) (USSR, Translations.)

AD-267 777 Div. 25, 7
(TIPTM/GEC) OTS price $2.75

Armour Research Foundation, Chicago, Ill.
METHODS OF PURIFICATION OF METALS AND INTERMETALLIC COMPOUNDS.
Summary technical rept. for 15 June 59-14 May 60 on Electrical and Electronic Materials, by Sherman Susman. Aug 61, 125p. incl. illus. tables, 25 refs. (Rept. no. ARF 3133-23)
(Contract AF 33(616)5895, Proj. 7371)
(WADD TR 59-303, pt. 2) Unclassified report

DESCRIPTORS: (*Purification of *Metals, *Intermetallic compounds, *Refractory materials, *Semiconductors, Transport properties, Impurities, Transition temperature.) (*Generators, Thermionic emission, Photoelectric cells.) (Chemical equilibrium, Single crystals, *Silicon compounds, *Carbides, Spectrographic analysis, *Thermoelectricity, Thermal conductivity, Electrical properties, Thermodynamics.) Diffusion, Aluminum, Calcium, Iron, Nickel, Vanadium, Copper.

A study was made of impurity transport in thermal gradients and other fields in materials potentially useful for thermoelectric, thermionic or photovoltaic power generation at high temperatures. The general problem of impurity distributions in an intense thermal gradient was considered. The physical and chemical properties of SiC were considered in the context of diffusion phenomena and thermoelectric behavior at elevated temperatures. Single crystals and polycrystalline rods of SiC were studied. Both chemical and spectrographic analyses were used for the qualitative and quantitative estimation of impurity content. Electrical resistivity and thermoelectric power measurements were made up to 1000 C. Polycrystalline SiC rods were subjected to intense thermal gradients by direct inductive coupling at 5 mc. Impurity redistribution is followed by spectrographic analysis. (Author)

AD-267 780 Div. 25
(TISTM/GEC) OTS price $1.60

National Technical U. (Greece).
CREEP CHARACTERISTICS OF TENSION MEMBERS IN HIGH TEMPERATURES BY USING THE PHOTO-SCREEN METHOD.
Final technical rept. 1 Nov 60-31 Oct 61, by Pericles S. Theocaris. 31 Oct 61, 10p. 23 refs.
(Contract DA 91-591-EUC-1632)
Unclassified report

DESCRIPTORS: (Optics, Measurement, Test methods, Test equipment, *Creep, Stresses, Metals, Alumimun alloys, Plasticity, Deformation, High temperature research, Mechanical properties.) Tensile properties.

The photo-screen method, based on the phenomenon of optical interference was developed to measure strains continuously over the whole surface of plane-strained specimens. The accuracy of the method was very high in case of large strains produced in plasticity and creep of metals. It was used to study the creep characteristics of various metals at elevated temperatures. One of 2 transparent gratings of the same pitch, mounted with the ruled surfaces in contact, was rotated slightly. The gratings was then transversed by a number of straight equidistant fringes, which are narrower and closer together the greater the acute angle between the two sets of rulings. With two gratings of equal pitch large plastic deformations could be measured. If two gratings of slightly different pitch were used then the initial interference pattern was added or subtracted from the pattern caused by the deformation of the specimen and the method was convenient to measure elastic strains with great accuracy. The method was applied to measurement of strain components of tension specimens of aluminum alloys subjected to pure tension at room temperature. The loading program was extended up to a fully plastic range. The variation of lateral contraction ratio was studied in the transition elastoplastic domain of metals. (Author)

AD-267 787 Div. 25
(TISTP/MFA) OTS price $3.60

Electronics Research Lab., U. of Calif., Berkeley.
SPACE-CHARGE WAVES AND PLASMA DIAGNOSTICS.
Rept. on Research on Physical Phenomena Affecting the Characteristics of Electronic Components, by A. W. Trivelpiece. July 61, 35p. incl. illus.
(Contract AF 33(616)6139, Proj. 4150)
(ASD TR 61-26) Unclassified report

Presented as an invited paper at the Second Annual Conference on the Engineering Aspects of Magnetohydrodynamics, 9-10 Mar 61, at the University of Penn., Philadelphia.

DESCRIPTORS: (*Plasma physics, *Space charges, *Electromagnetic waves, Wave transmission, Axially symmetric flow, Cylindrical bodies.) (Waveguides, Electric fields, Magnetic fields, Elastic scattering, Attenuation.) (Differential equations, Integral transforms, Tensor analysis.)

The properties of the characteristic modes of propagation on an axially magnetized cylindrical plasma column are reviewed briefly. It is then shown that in some cases these modes can give rise to errors in the measurement of the properties of a plasma by the conventional microwave transmission method of plasma diagnostics, where it has been tacitly assumed that the plasma is very large compared to the wavelength of the diagnostics signal. The specific case of electric vector parallel to the axis of a plasma column is analyzed to illustrate the essential features of the coupling of a diagnostics signal to the space-charge-wave modes. (Author)

AD-267 803 Div. 25, 12
(TISTP/WH) OTS price $8.60

Minnesota U. School of Physics, Minneapolis.
OBSERVATIONS OF THE VAN ALLEN RADIATION REGIONS DURING AUGUST AND SEPTEMBER 1959. PART II: THE

CAPETOWN ANOMALY AND THE SHAPE OF THE OUTER BELT. PART III: ELECTRON SPECTRA AND FLUXES IN THE OUTER ZONE. PART IV: THE INNER BELT,
by R. L. Arnoldy, R. A. Hoffman, and J. R. Winckler. Nov 61, 84p. incl. illus. tables (Technical rept. no. CR-46)
(Contract NASw-56)
Unclassified report

DESCRIPTORS: *Van Allen radiation belt. (Van Allen radiation belt, Magnetic fields, Particle trajectories.) (Van Allen radiation belt, Spectrographic analysis, Electrons.) (Van Allen radiation belt, Measurement, Satellite vehicles, Spectrographic analysis, Energy, Protons.)

AD-267 808 Div. 25, 4
(TISTM/REB) OTS price $1.60

Naval Research Lab., Washington, D. C.
FACTORS AFFECTING THE DETERMINATION OF MONOETHANOLAMINE NORMALITY BY REFRACTIVE INDEX MEASUREMENT,
by C. H. Blachly, H. Ravner, and C. R. Singleterry. 27 Oct 61, 15p. incl. illus. tables, 11 refs.
(NRL Rept. no. 5698)
Unclassified report

DESCRIPTORS: (*Ethanols, *Amines, Refractive index, Instrumentation, Refractometers, Shipborne.) (Carbon dioxide, Disposal, Towers (Chemistry), Submarines, Atmosphere.) Titration, Solutions.

A method is described for the rapid determination of the normality of monoethanolamine (MEA) solutions in submarine CO2 scrubber systems which requires measurements of only the refractive index of the solution and the CO2 content of the air. Because of errors resulting from the accumulation of nonbasic degradation products which contribute to the refractive index but not to the basicity of used MEA solutions, one daily titration is necessary to provide a 24-hr correction factor. The magnitude of the correction factor may provide a useful index to the remaining service life of the solutions. (Author)

AD-267 838 Div. 25
(TISTM/TCG) OTS price $9.60

Electrical Engineering Research Lab., U. of Illinois, Urbana.
DRIFT MOBILITIES OF ELECTRONS AND HOLES AND SPACE-CHARGE-LIMITED CURRENTS IN AMORPHOUS SELENIUM FILMS,
by J. L. Hartke. 1 Sep 61, 112p. incl. illus. tables, 68 refs. (Technical note no. 5)
(Contract AF 49(638)417, Proj. 9763)
(AFOSR-1416) Unclassified report

DESCRIPTORS: (*Electrons, Photons, *Electron transitions, Electron charge in *Selenium, *Films or Liquids, Porous metals with Arsenic, Additives, Electrical properties, Electron capture, Electric fields, Electric currents, Measurement, Theory.) (Gold, Tellurium, Electrodes.) *Semiconducting films, Semiconductors.

The results of drift mobility and space-charge-limited current measurements made on 20-micron-thick films of amorphous Se were interpreted using the band model of a semiconducting solid with impurity or imperfection levels in the forbidden energy region between the conduction and valence bands. Drift mobilities were measured in the 220 to 300 K temperature range by determining the time of transit across the films of carriers which were photoinjected at one surface by 10 to the -8th power sec light pulses. The drift mobilities at 300 K were 0.165 sq cm/v sec for holes and 7.8 x 0.001 sq cm/v sec for electrons. The temperature dependence of hole mobility was exp(-0.14 ev/kT), and that of electrons was exp(-0.285 ev/kT). About 10 to the 19th power/cc electron traps were present in a 0.285-ev region just below the conduction band edge; about 10 to the 21st power/cc hole traps occupied a 0.14-ev portion of the gap immediately above the valence band edge. Au and Te electrodes were used to inject holes into amorphous Se, producing space-charge-limited currents at high fields. Electrical conductivities of 10 to the -14th to 10 to the -16th power/ohm/cm were obtained at low fields. (Author)

AD-267 854 Div. 25
(TISTP/MFA) OTS price $2.60

Space Technology Labs., Inc., Los Angeles, Calif.
TENSILE CIRCUMFERENTIAL STRESSES CREATED BY THE UNLOADING MECHANISM OF A SUDDENLY PUNCHED HOLE IN A STRETCHED ELASTIC PLATE,
by Julius Miklowitz. 24 Apr 58, 15p. incl. illus. (Rept. no. EM 8-11; GM-TR-0165-00380)
Unclassified report

DESCRIPTORS: (*Stresses, *Tensile properties, Mechanical properties, Elasticity, Sheets, Tanks, Deformation, Compression shock, Projectiles.) (Mathematical analysis, Transformations (Mathematics), Partial differential equations, Bessel functions, Integration.)

The dynamic stresses created in a stretched elastic plate, by the sudden punching of a hole at its center are considered. Complete information is presented on the tensile circumferential stresses generated by the unloading waves which are created during punching. It is shown that the maximum dynamic stress in the vicinity of the hole is considerably larger than its related static value. It is pointed out that this will be important to the creation of a propagating crack. (Author)

AD-267 882 Div. 25
(TISTP/MFA) OTS price $6.60

Microwave Physics Lab., Palo Alto, Calif.
INVESTIGATION OF DEPENDENCE OF MICROWAVE HARMONIC GENERATION UPON NON-LINEARITIES IN FERRIMAGNETIC MATERIALS.
Final rept.,
by Robert M. Hill, Gabriel F. Herrmann and Robert S. Bergman. 15 Sep 61, 58p. incl. illus.
(Contract AF 19(604)5512)
(AFCRL-934) Unclassified report

DESCRIPTORS: (*Magnetic materials, *Ferrites, Electromagnetic waves, Crystal structure, Crystals, Garnet, Scattering, *Microwaves, Harmonic oscillators, Resonance, Frequency.) (Instrumentaion, Experimental data.) (*Harmonic analysis, Fourier analysis, Combinatorial analysis, Transformations (Mathematics), Polynomials.)

Two aspects of the non-linear response of ferromagnetically coupled spin systems to microwaves were studied. Small signal non-linearities in spherical samples are shown to be very sensitive

to the internal anisotropy fields. General expressions for the harmonic response of the magnetization are derived and shown to agree with the experimental observation of yttrium iron garnet spheres. At signal levels above the onset of spin wave excitation, unstable response of the spin system is observed. Experimental observations indicate that this instability, which is usually periodic, is associated with changes in the value of macroscopic magnetization M. The implications of this are discussed. (Author)

AD-267 885 Div. 25
(TISTA/VGW) OTS price $4.60

Space Technology Labs., Inc., Los Angeles, Calif.
THE SUPERFAST LONGITUDINAL PINCH,
by Burton D. Fried. 12 Nov 57, 40p. incl. illus. tables.
(Contract AF 04(647)127)
(ARL-7-60) Unclassified report

DESCRIPTORS: (Magnetohydrodynamics, Compression shock from *Magnetic pinch for Heating of Deuteron beams in Ion accelerators for Thermonuclear reactions, Theory, Mathematical analysis, Mathematical prediction, Tests.) (Plasma physics, Magnetic fields, Electromagnetic fields, Electromagnetism, Theory.)

The superfast nonadiabatic pinch is a promising method of heating a plasma without violating the conditions necessary for subsequent confinement with a stabilized pinch. An experimental test of the feasibility of a superfast longitudinal pinch at high density is in progress. The ideas underlying this concept are reviewed and a simple theoretical model is used for calculations of the results to be expected. (Author)

AD-267 906 Div. 25, 10
(TISTP/MFA) OTS price $8.10

Little, Arthur D., Inc., Cambridge, Mass.
ATMOSPHERIC HEAT TRANSFER TO VERTICAL TANKS FILLED WITH LIQUID OXYGEN.
15 Nov 57, 79p. incl. illus. tables (Special rept. no. 50)
(Contract AF 04(647)130)
Unclassified report

DESCRIPTORS: (*Heat transfer, Atmosphere, *Tanks, Oxygen, Liquefied gases, Oxygen, Boiling, Thermal conductivity, Fuel tanks.) (*Instrumentation, Storage tanks, Internal combustion engines, Control systems, Recording devices.) (Experimental data, Humidity, Wind, Velocity, Temperature.) (Photographic analysis, Tables.)

A method for estimating the rate of liquid-oxygen boiloff from uninsulated missile tanks for a variety of environmental conditions while the missile is on the ground is presented. An experimental investigation was made of oxygen boiloff on reduced-scale equipment to establish reliable criteria for the design of the full-scale loading and storage system. For convenient engineering use, the data obtained is summarized in five graphs. The data is correlated with established heat- and mass-transfer relationships. Information on the quantity and characteristics of the frost and ice that form on the tank under various simulated weather conditions is also furnished. (Author)

AD-267 930 Div. 25, 20, 7
(TISTP/MFA) OTS price $16.00

Atomics International, Canoga Park, Calif.
BASIC RESEARCH IN THERMIONIC ENERGY CONVERSION PROCESSES.
Summary rept. no. 1,
ed. by Ned S. Rasor. 15 Nov 61, 231p. incl. illus. tables, 75 refs. (Rept. no. AI-6799)
(Contract Nonr-319200)
Unclassified report

DESCRIPTORS: (*Thermionic emission, Nuclear energy, Power reactors, Nuclear power plants, Research program administration, *Symposia.) (Thermionic emission, Electrons, Ions, Atoms, Mechanical properties, Surface properties, Diodes, Molybdenum, Metals.) (Plasma physics, Plasma oscillations, Electric discharges, Discharge tubes.) (Thermodynamics, Photonuclear reactions, Transport properties, X-ray diffraction analysis.) (Instrumentation, Oscilloscopes, Electrodes, Electron guns, Ferrite cores, Evaporators.) (Gas flow, Kinetic theory, Cesium compounds.) (Beryllium, Barium.) (Experimental data, Tables.)

Contents:
Processes
Emission limitation on thermionic energy conversion
Correlation of electron, ion, and atom emission energies
Potential of an ion in a discrete dipole layer
Statistical mechanical treatment of surface ionization
An experimental search for an elemental surface exhibiting low electron work function
Cs-O-H-Mo system interactions and transfer of molybdenum within a thermionic diode
Analysis of the space charge mode in the cesium thermionic diode
Plasma mode in a thermionic diode with detailed energy balance
Plasma resistivity and collective interactions
Instabilities in high current discharges in cesium vapor

AD-267 944 Div. 25
(TISTM/EJH) OTS price $1.60

Laboratoire d'Infra Rouge Technique et Applique (France).
STUDY OF THE EDGE EMISSION OF CADMIUM SULPHIDE AND SILICON BOMBARDED BY ELECTRONS.
Final technical rept., 1 Oct 60-30 Sep 61.
30 Sep 61, 12p. incl. illus.
(Contract N62558-2720)
Unclassified report

DESCRIPTORS: (*Semiconductors, *Cadmium compounds, Zinc compounds, *Sulfides, *Silicon, Crystals, Electron bombardment, Radiation effects, Photoemission, *Secondary emission, Electron transitions, Theory, Solid state physics.) (Test equipment, Infrared spectrophotometers, Photomultipliers, Potentiometers.)

Mixed cadmium and zinc sulfides were obtained with a view to testing whether a coincidence is still observed between the absorption edge of the spectrum and the wavelength of the light emitted. The main results are those obtained from studies at liquid air temperature. On certain samples a complex light is obtained, containing a yellow band, a green band and a blue band at about 4900 angstroms, this wavelength corresponding to that of the absorption edge at the same temperature. On other crystals however, this band is

very weak or disappears completely. In these cases only the green band, fairly complex in structure, and the yellow band appear. All the characteristics of the phenomenon appear to indicate that the light observed is due to a direct return from the conduction band to the valence band, or to a return from a level very close to the conduction band to the valence band. (Author)

AD-267 975 Div. 25
(TISTP/JW) OTS price $3.60

Kane Engineering Labs., Palo Alto, Calif.
INVESTIGATION AND STUDY OF PROPAGATION IN AND PROPERTIES OF NON-UNIFORM PLASMAS.
Quarterly technical rept. no. 2,
by A. Vassiliadis. 1 Aug 61, 32p.
(Contract AF 30(602)2447, Proj. 5561)
(RADC TN 61-238) Unclassified report

DESCRIPTORS: (*Plasma physics, Entropy, Ionization.) (Electromagnetic properties, Dielectrics.) (Wave transmission, Equations.) (*Plasma physics, Electromagnetic waves, *Wave characteristics, *Microwaves, Propagation.)

The study of propagation of electromagnetic waves in non-uniform plasmas is extended. In one phase of the study, the periodically distributed plasma is re-examined, and corrected results are presented. Attention is then focused on monotonically increasing ionization in the plasma, and closed form solutions are obtained for the case of a transverse and of a longitudinal electric field. In the second phase of the investigation, the phenomenological approach to derive the conductivity of a plasma in the case of large fields is extended to the constant mean-free-path model. (Author)

AD-267 977 Div. 25
(TISTM/GEC) OTS price $2.60

Leicester U. (Gt. Brit.).
INVESTIGATION OF THE CONDUCTION MECHANISM IN INSULATING SOLIDS.
Final technical rept. no. 2, 1 Nov 60-30 Nov 61.
30 Nov 61, 29p. incl. illus. 21 refs.
(Contract DA 91-591-EUC-1614)
Unclassified report

DESCRIPTORS: (*Conductivity, *Insulating materials, Solids, Electric insulation, Crystals, *Selenium, Lattices, *Cadmium compounds, *Sulfides, Electrodes, Gold, Indium.) (Tests, Test methods, Electrical properties, Surface properties, Temperature, Electron charge, Transport properties.) (Measurement, Thickness.) (Electrons, Pulse generators, Design.)

Charge transport in insulating solids was studied. Fast pulse methods were used to study the drift mobility of generated carriers. The investigation of carrier mobility and charge transport in monoclinic Se crystals which consist of a lattice of puckered Se_8 rings is reported. Work on CdS crystals is discussed. Experiments were carried out to investigate the effect of various electrode materials on the response to the fast excitation pulse. For the observation of carrier transits, the free carriers must be generated near a blocking electrode, but the opposite electrode should be injecting. Room temperature measurements carried out on specimens with Au (top) and In (bottom) electrodes led to an electron drift mobility of 280 sq cm/v sec. With decreasing temperature, electron drift mobility goes through a maximum and then decreases exponentially. Using crystals with exceptionally long hole life times it has been possible to measure the drift mobility of holes in CdS to be about 0.2 sq cm/v sec at room temperature. (Author)

AD-267 978 Div. 25
(TISTE/CRJ) OTS price $.75

Minnesota U., Minneapolis.
STUDY OF NOISE PROPERTIES OF GAS DISCHARGES. VOLUME I.
by A. Van der Ziel. Sep 61, 18p. incl. illus. 24 refs.
(Contract AF 33(616)5479, Proj. 4150)
(ASD TR 61-179, vol. 1)
Unclassified report

DESCRIPTORS: (*Gas discharges, Noise, Theory.) (*Electromagnetic waves, Measurement, *Plasma physics, Bremsstrahlung, High frequency, Neon, Wave transmission.) (Gas ionization, Electrons, Energy, Discharge tubes.)

The results obtained in the study of electromagnetic radiation from gaseous plasmas indicate strongly that reliable data can be obtained, provided sufficient care is taken in eliminating systematical errors. The measurements are carried out in the frequency range 100-2000 mc and concern the transition of a plasma from a transparent to an opaque condition, the frequency spectrum of the plasma radiation, and the comparison of results with the data obtained with the conventional Langmuir probe. (Author)

AD-267 986 Div. 25
(TISTP/JW) OTS price $1.10

Johns Hopkins U., Baltimore, Md.
EVIDENCE FOR A THREE-PION RESONANCE NEAR 550 MEV,
by A. Pevsner, R. Kraemer and others. 9 Nov 61, 9p. incl. illus.
(In cooperation with Northwestern U., Evanston, Ill.)
(AFOSR-1754) Unclassified report

DESCRIPTORS: (*Pions, *Resonance, Nuclear resonance.) (Protons, Isotopes, Electron diffraction analysis.) (*Nuclear reactions, Pions, Mesons, Deuterons, Quantum statistics.)

AD-268 005 Div. 25
(TISTP/MFA) OTS price $1.60

University of Southern Calif., Los Angeles, Calif.
FLUORESCENCE INDUCED BY VACUUM ULTRAVIOLET RADIATION,
by R. I. Schoen, D. L. Judge, and G. L. Weissler.
20 Mar 61, 13p. incl. illus.
(Contract AF 19(604)6119)
(AFCRL-482) Unclassified report

DESCRIPTORS: (*Ultraviolet radiation, *Vacuum systems, Monochromatic light, *Fluorescence, Photons, Photochemical reactions.) (Visual thresholds, Absorption, Ionization, Gases, Nitrogen, Argon, Oxygen, Carbon compounds, Monotides.) (Instrumentation, Photomultipliers, Manometers, Oscilloscopes.)

Dispersed vacuum ultraviolet radiation between 500A and 1000A was used to excite N2, O2, and CO to upper electronic states of the corresponding molecular ion, and fluorescent emission from these levels was observed. Preliminary results are presented, showing the variation of the fluorescent intensity as a function of the energy of the exciting radiation and of the gas pressure. (Author)

AD-268 033 Div. 25, 26, 8
(TISTM/TCG) OTS price $1.60

Air Force Cambridge Research Labs., Bedford, Mass.
A NOTE ON SEMICONDUCTOR DEVICE FABRICATION,
by I. Berman. Aug 61, 13p. incl. tables (Rept. no. AFCRL-729)
(Proj. 4608)
Unclassified report

DESCRIPTORS: (*Semiconductors, Intermetallic compounds, Germanium compounds, Silicon compounds, Production, Test methods.) (Alloys, Impurities, Electroerosive mechining, Chemical milling, Pickling compounds, Bonding, Heating, Plating.)

A discussion is presented of the basic steps in the making of Ge and Si junction devices. It includes a list of the common etchants with their relation to various phases of device fabrication. Consideration is given to alloying for junctions and ohmic contacts, as well as information on applying the dopant alloy. Electroless Ni or Au gold, furnace firing, and plating are examined in view of required modifications. (Author)

AD-268 046 Div. 25, 4
(TISTP/JW) OTS price $1.10

Bureau of Mines, Bartlesville, Okla.
THE HEAT OF FORMATION OF SILICA.
Technical note,
by W. D. Good. Nov 61, 4p. (Contribution no. 112) (Contract CSO 59-9)
(AFOSR-1701; ARPA Order no. 24-59)
Unclassified report

DESCRIPTORS: (Dioxides, *Silicon compounds, Quartz, *Heat of formation, Colorimeters, Thermochemistry.)

AD-268 062 Div. 25
(TISTP/TL) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson AFB, Ohio.
CALCULATION OF NONUNIFORMLY HEATED CYLINDERS IN THE ELASTOPLASTIC REGION,
by B. F. Shorr. 1 Dec 61, 11p. incl. illus. (Trans. no. FTD-TT-61-129 of Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk, Mekhanika i Mashinostroyeniye, No. 6:57-62, 1960)
Unclassified report

DESCRIPTORS: (*Cylindrical bodies, Heat, *Plasticity, *Deformation, Temperature.) (Material, Stresses, Mechanical properties, Physical properties, Tensor analysis, Volume, *Elasticity.) (Operators (Mathematics), Equations, Integration.)

Within the scope of the theory of small elastoplastic deformations, two methods are given for solving the problem of thermoplasticity, taking work-hardening and compressibility into account, i.e., the method of elastic solutions (using the operators of complementary stresses) and the method of plastic solutions, on the basis of which we will examine the elastoplastic state of thick-walled cylinders in the presence of axisymmetric stress and heating with an arbitrary radial distribution of the temperature and physicomechanical properties of the material. (Author)

AD-268 065 Div. 25, 9, 12
(TISTP/TL) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
PERTURBATIONS IN THE IONOSPHERE CAUSED BY MOVING BODY,
by A. V. Gurevich. 20 Nov 61, 21p. incl. illus. tables (Trans. no. FTD-TT-61-143 of Trudy no. 17 (27) Rasprostraneniye Radiovoln i Ionosfera, Izdatelstvo Akademii Nauk SSSR, Trudy Instituta Zemnogo Magnetizma, Ionosfery i Rasprostraneniya Radiovoln:pp. 173-186, 1960)
Unclassified report

DESCRIPTORS: (*Satellite vehicles, *Orbital flight paths, *Perturbation theory, *Ionosphere.) (Surfaces, Spheres, Gases, Gas flow, Density, Ions, Electrons, Electric fields, Measurement, Temperature.) (Radio waves, Diffusion, Superaerodynamics.) (Particles, *Plasma physics, Molecules, Gas Ionization, Reflection, Supersonics, Velocity, Condensation.) (Bessel functions, Statistical functions.) (*Hydrodynamics, *Quantum mechanics.)

Calculation of the magnitude of perturbations is accomplished. The changes in concentrations of neutral particles in the vicinity of a moving body are calculated. A problem is solved for the concentration of electrons and ions; also the magnitude of the electric field was determined. An analysis is made of the problem concerning the possibility of exciting longitudinal waves in plasma by a stream of ions reflected from the body. (Author)

AD-268 067 Div. 25
(TISTP/JW) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
HEAT EXCHANGE DURING BUBBLE BOILING,
by F. P. Minchenko. 1 Dec 61, 13p. incl. illus. tables (Trans. no. FTD-TT-61-153 of Energomashinostroyeniye, No. 6:17-21, 1960)
Unclassified report

DESCRIPTORS: (Translations, USSR.) (*Heat exchangers, *Heat transfer, Boiling, Lithium compounds, Water.) (Salts, Boilers.)

Results are given of a study of the heat transfer to boiling water and solutions of Li salts, with large-volume equipment and a circulation loop. An analysis and the general dependence of their criteria are given; this dependence is compared with the familiar dimensionless formulas. (Author)

AD-268 095 Div. 25
(TISTP/MFA) OTS price $10.50

Geophysics Corp. of America, Bedford, Mass.
PLASMA REACTION STUDIES.

Final technical rept.,
by P. J. Nawrocki and R. Papa. 5 Dec 61, 130p. incl. illus. tables (GCA Technical rept. no. 61-43-A)
(Contract AF 19(604)7405)
(AFCRL-978) Unclassified report

DESCRIPTORS: (*Plasma physics, *Stratosphere, Transport properties, Gas ionization, *Recombination reactions.) (*Masers, Electromagnetic waves, *Thermal radiation, Infrared radiation, Microwave oscillators, Microwave amplifiers, Monochromatic light.) (Particles, Electrons, Elastic scattering, Molecules, Inelastic scatttering.) (Quantum mechanics, Fourier analysis, Polynomials, Integration, Perturbation theory.)

Contents:
The upper atmosphere
Solar flux, photo-ionization and absorption cross sections
Reaction rates
Transition probabilities
Radiation losses in RF excited plasmas
Electron energy distribution functions and Boltzmann equation
Breakdown in a spherical cavity by a remote RF antenna
A direct measurement of RF breakdown in the upper atmosphere
RF breakdown in perturbed atmospheres

26. PRODUCTION AND MANAGEMENT

AD-267 121 Div. 26, 14, 31
(TISTW/EET) OTS price $1.10

Rubber Lab., Mare Island Naval Shipyard, Vallejo, Calif.
DEVELOPMENT OF SEALS FOR HIGH PRESSURE AIR SYSTEMS IN SUBMARINES.
Progress rept. no. 5,
by R. D. Ford. 21 Sep 61, 10p. incl. illus.
(Rept. no. 28-8)
(Proj. no. S-F013-13-01)
Unclassified report

DESCRIPTORS: (*Rubber seals, *Pneumatic systems for Submarines, Effectiveness.) (Synthetic rubber, *Seals, Materials, Physical properties, Mechanical properties, High pressure research.) (Compressed air, High pressure compressors.)

The Laboratory was requested to develop a formulation for rubber seals to be used in the high pressure air systems of fleet-ballistic-missile submarines. The two best stocks reported previously were highly resistant to both the petroleum and phosphate-ester lubricants used in the air compressors. Seals made from both stocks had excellent resistance to swelling by high pressure air. O-rings prepared from the first stock, showed moderate backrinding when removed from hot molds. The second stock cured without backrinding. (Author)

AD-267 208 Div. 26
(TISTB/MS) OTS price $4.60

Hayden-McGrane Associates, Washington, D. C.
ROLE OF MANAGEMENT CONSULTANTS IN AUTOMATION,
by Joseph Hayden. 1958, 38p. 18 refs.
Unclassified report

DESCRIPTORS: (*Management engineering, Data processing systems, *Automation, Industry, Personnel, Scheduling, Reasoning.)

AD-267 212 Div. 26, 14, 17, 12
(TISTM/EJH) OTS price $7.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
A GENERAL STUDY OF PROCESSES FOR THE REALIZATION OF DESIGN CONFIGURATIONS IN MATERIALS.
Interim technical progress rept. 3 Apr-3 Oct 61 on Proj. NEOS,
by Paul Rosenthal and H. T. McAdams. Oct 61, 64p. incl. illus. tables, 31 refs. (Rept. no. NM-1559-P-1)
(Contract AF 33(600)42921, Proj. NR 7-867)
(ASD IR-1) Unclassified report

DESCRIPTORS: (Spaceships, Satellite vehicles, Materials, *Manufacturing methods, Production.) (*Materials, *Refractory materials, Ceramic materials, Chemical bonds, Chemical properties, Mechanical properties, Physical properties, Microstructure, Crystal structure, Radiation effects, Crystals, Growth.) (*Machining, Energy, Electric discharges, Plasma jets, Chemical milling, Electrochemistry, Ultrasonics, Electron beams, Ion beams, Erosion, Abrasion, Explosive forming, Magnetic fields.) (Pressure, Temperature, Controlled atmospheres, Electric fields, Magnetic fields.)

A rationale and a systematic approach were developed from a novel, completely generalized, abstract concept of the manufacturing process. Processes are classified according to form of energy, mode of energy transfer, environment, and process topology. Materials are classified according to type of bond, and the dominant role of their structure-sensitive properties is discussed. Exploratory studies of phenomena suitable for novel processes are presented; e.g. a recently discovered mechanical resonance phenomenon shows promise of reducing the required flow stress in certain forming operations. (Author)

AD-267 260 Div. 26, 17
(TISTM/GEL) OTS price $5.60

Beryllium Corp., Reading, Pa.
DEVELOPMENT OF TECHNIQUES FOR PRODUCING BERYLLIUM STRUCTURAL SHAPES.
Interim technical engineering rept. no. 4 (Final) on Phase 3, 19 May-13 Nov 61,
by E. E. Weismantel and K. C. Taber. 13 Nov 61, 51p. incl. illus. tables.
(Contract AF 33(600)41959)
Unclassified report

DESCRIPTORS: (*Beryllium, *Beryllium alloys, Manufacturing methods, Production, *Processing, Sheets, Deformation, Extrusion, Rolling mills, Metal forming brakes, Tensile properties, Mechanical properties, Microstructure.)

Solid shapes (rounds and squares) of Be were proven readily producible through simple roll reduction of previously extruded shapes. Angles, channels, and zees can be formed through the bending of sheet metal of the desired thickness

to the desired geometry. For forming at 1350 to 1400 F, an 0.060-in.-thick sheet required a 3T to 4T internal forming radius if roll forming was used whereas a 7T radius was necessary for mechanical press brake forming. For 0.188-in.-thick sheet a radius of 3T to 4T was required for roll forming, and mechanical press brake forming required a 4 1/2T radius for satisfactory bends in this temperature range. A composite billet process was developed for production of tee shaped sections not producible by the methods used for the other shapes. Potential exists in this method for the production of complex shapes to higher strength levels than those originally specified. Introductory experiments demonstrated the ability to achieve over 100,000 psi ultimate tensile strength and 70,000 psi tensile yield strength with 5% elongation. (Author)

AD-267 297 Div. 26, 15
(TISTP/MFA) OTS price $2.60

Princeton U., N. J.
AN ECONOMIC SURVIVAL GAME.
Rept. on Econometric Research Program,
by Koichi Miyasawa. 1 Sep 61, 27p. incl. illus.
(Research memo. no. 31)
Unclassified report

DESCRIPTORS: (*Management engineering, *Economics, *Games theory, Survival, Economic conditions, Costs.) (Statistical analysis, Mathematical prediction, Equations, Probability, Distribution theory.)

A model of the economic survival game of a firm's profit is interpreted as the realized value of the market random variable. But it is not stated explicitly what the distribution of this random variable depends on. In terms of usage in decision theory, it may be said that it is determined by the world. So, in that sense, the economic survival game treated here belongs to the class of games against nature. (Author)

AD-267 314 Div. 26, 17
(TISTM/GEC) OTS price $1.60

Aeroprojects, Inc., West Chester, Pa.
ULTRASONIC WELDING OF REFRACTORY METALS.
Bimonthly progress rept. no. 4, 1 Aug-30 Sep 61,
by C. R. Frownfelter. 9 Nov 61, 11p. incl. illus. tables.
(Contract NOw 61-0410-c)
Unclassified report

DESCRIPTORS: (*Refractory materials, *Heat resistant alloys, Brittle materials, *Ultrasonics, *Welding, Sheets.) (Welds, Mechanical properties, Tensile properties, Shear stresses, Deformation, Fracture (Mechanics).) (Molybdenum alloys, Titanium alloys, Niobium, Tungsten, Surface properties, Standing wave ratios, Heat treatment.)

Internal plastic deformation is commonly observed in microsections of ultrasonic welds and was noted in weld sections of brittle materials such as Be. Certain brittle materials tend to crack during ultrasonic welding. Consideration of means to eliminate this occasional cracking tendency suggests methods to permit plastic flow and to inhibit cracking: (1) use of temperatures above the ductile-brittle transition point prior to the application of stresses; (2) welding with the weld locale in compression; (3) decreasing the number of stress cycles to which the material is subjected during ultrasonic welding. (Author)

AD-267 373 Div. 26
(TISTB/MS) OTS price $1.60

Hayden-McCrane Associates, Washington, D. C.
MANAGEMENT SYSTEM FOR THE CONTROL OF BASIC RESEARCH,
by Joseph Hayden. 1961, 12p. incl. illus.
Unclassified report

DESCRIPTORS: (*Management engineering, Scientific research, Scheduling, Control.)

AD-267 469 Div. 26, 27
(TISTA/SEB) OTS price $2.60

Naval Ordnance Test Station, China Lake, Calif.
FABRICATION OF PRESSURE VESSEL THROUGH FILAMENT WINDING PROCESSES.
by R. B. McKee. Oct 61, 30p. incl. illus. (NOTS TP 2780)
(NAVWEPS rept. no. 7788) Unclassified report

DESCRIPTORS: (Pressure vessels, *Manufacturing methods, *Filament wound construction, Mechanics, Pressures, Stresses, Theory, Mathematical analysis.) (*Wire winding machines, Design.) (Production, Processing of *Rocket cases, Rocket motors, Combustion chambers around Solid rocket propellants, Propellant grain.) (Glass textiles, Reinforcing material, Resin.) (Spheres, Hemispherical shells, Cylindrical bodies.)

The mechanics of filament winding are discussed from the standpoint of fabricating combustion chambers for rocket motors. Special attention is given to the winding of resin-reinforced glass filaments directly on solid-propellant grains. Mathematical expressions for stresses in pressure vessels of various shapes: spheroids, cylinders, geodesic ovaloids, and isotensoids are derived, and winding patterns suitable for each are discussed. Filament-winding machinery is discussed, and recommendations are made regarding the modification of a winding machine already in use at NOTS. (Author)

AD-267 494 Div. 26, 17
(TISTM/GEC) OTS price $9.10

General Dynamics/Fort Worth, Tex.
EFFECTS OF ANDROFORMING ON MATERIAL PROPERTIES.
Interim technical engineering rept. no. 2,
1 Aug-31 Oct 61,
by C. D. Lantz, C. B. Crandall and others.
Nov 61, 101p. incl. illus. tables.
(Contract AF 33(600)42847, Proj. 7-910)
(ASD TR 7-910, II) Unclassified report

DESCRIPTORS: (*Aluminum alloys, *Stainless steel, *Titanium alloys, Sheets, Metal plates, *Processing, Metal forming presses, Plasticity.) (*Machines, Operation, Nomographs.) (Manufcacturing methods, Airframes, Deformation, Heat treatment, Mechanical properties, Stresses, Tensile properties.) Alloys.

The sheet metal forming parameters of the Model J Androform machine were established for .010, .040, .080, and .125-in.-thick materials in various heat treated conditions of Al stainless steel, and Ti. Nomographs were derived for determining the longitudinal and transverse contour combinations which are within

the Androform machine forming limits. Mechanical property tests were conducted on the .040 alloys, all of which were formed to maximum contour. Results showed a general increase in tensile and compressive yield values with a loss in per cent elongation. The titanium materials, RS-140 and 4Al-3Mo-1V in the solution treated and solution treated and aged conditions, were exceptions. The compressive yield strengths of these materials decreased. (Author)

AD-267 499 Div. 26, 32
(TISTB/MS) OTS price $7.60

Operations Research Office, Johns Hopkins U., Bethesda, Md.
MANAGEMENT SCIENCE. AN INTELLECTUAL INNOVATION,
by Nicholas M. Smith and Milton C. Marney.
Aug 61, 70p. incl. illus. 22 refs. (Technical paper no. ORO-TP-43)
Unclassified report

DESCRIPTORS: (*Management engineering, Operations research, Scientific research, Theory.)

AD-267 720 Div. 26
(TISTW/RD) OTS price $4.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
ON THE RELIABILITY AND ACCURACY OF AUTOMATIC MANUFACTURE (O Nadezhnosti i Tochnosti Avtomaticheskogo Proizvodstva),
by N. G. Bruyevich. 15 Nov 61, 37p. incl. illus. table (Trans. no. FTD-TT-61-138 of Izvestiya Akademii Nauk SSSR, Otn, Energetika I Avtomatika, Issue no. 4:59-78, 1959)
Unclassified report

DESCRIPTORS: (Technological intelligence, USSR, Translations.) (*Manufacturing methods, Production, *Automation, *Reliability, Electronic equipment, Errors.)

AD-267 735 Div. 26, 17
(TISTM/GEC) OTS price $2.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
TECHNOLOGY OF PRODUCTION AND MELTING OF EXTRUDED AND BRIQUETTED ELECTRODES FOR MELTING TITANIUM ALLOYS,
by I. V. Polin and Yu. I. Kozlovich. 28 Aug 61, 23p. incl. tables (Trans. no. MCL-1010 of Metallurgiya, Sbornik Statey 2:221-235, 1959)
Unclassified report

DESCRIPTORS: (Manufacturing methods, Production, Processing, *Melting, Extrusion, Metal forming presses, Metallurgy, *Electrodes, *Titanium alloys, Aluminum alloys, Resistance, Tensile properties, Mechanical properties.) (Technological intelligence, Translations, USSR.)

Investigation of the technology of manufacture of press-formed consumable electrodes for melting Ti alloys revealed that it was possible to use less powerful presses for this purpose than in pressing through a tapered die by extrusion. An investigation of rational distribution of alloying elements in the press-formed electrode demonstrated the practicability of placing them in the center of the briquet with the creation, around this, of a dense wall of pressed sponge preventing the fused mass of fusible alloys from escaping and also preventing intensified evaporation of elements of higher vapor pressure than Ti. It was also found that the reaction between Al and Ti sponge, prior to the time that it enters directly into the zone of fusion, is small. The quantity of sponge to be employed in the press forming of a consumable electrode by batchwise alloying rendered it impossible for the weight of a batch of sponge between 3 and 1.4 kg to affect uniformity of distribution of Al in the alloy and its mechanical properties. The method of batchwise alloying, using a ratio between the weight of the portion of sponge used in the press forming and the weight of the molten metal in bath, as high as 1 to 3, is dependable. (Author)

AD-267 806 Div. 26, 17, 25
(TISTM/TCG) OTS price $1.10

Metals Research Ltd. (Gt. Brit.).
THE PRODUCTION OF THIN COPPER SINGLE CRYSTALS. A FEASIBILITY STUDY.
1961, 5p.
(Contract DA 91-591-EUC-1722)
Unclassified report

DESCRIPTORS: (*Copper, Single crystals, Disks, Sheets, Cadmium, Production, Feasibility studies, Heating, Melting, Crystallization, Spark machining, Test methods.) (Chemical milling, Iron compounds, Chlorides, Acetic acids, Nitric acid, Phosphoric acid.)

A method was developed for producing a stack of Cu single crystal disks 50-microns thick which utilized the spark planning technique followed by chemical polishing. The method for processing 35- to 50-micron thick disks is as follows: (1) grow 2.5-mm thick slabs as big as possible, (2) spark-trepan 1-cm diam discs and spark plane to 75 to 100 microns thick, and (3) chemically thin to 35 to 50 microns. Attempts to grow single crystal Cd disks resulted in the formation of polycrystalline sheets.

AD-267 925 Div. 26, 14
(TISTM/GEC) OTS price $1.10

Science and Tech. Branch, Aerospace Information Div., Washington, D. C.
MECHANIZATION AND AUTOMATION OF THE SOVIET RUBBER INDUSTRY.
13 Nov 61, 2p. (AID Rept. 61-151; Trans. of Second Conference on the Automation and Mechanization of the Basic Processes of the Rubber Industry. Kauchuk I Rezina, no. 8:55-57, Aug 61; Greeting the 22nd Congress of the Communist Party of the Soviet Union. Fulfillment of Socialist Obligations by Industrial Rubber Products Plants. Kauchuk I Rezina, no. 8:59-61, Aug 61; Durable Shoes for Automobiles. Ekonomicheskaya Gazeta 12, 18 Sep 61)
Unclassified report

DESCRIPTORS: (*Rubber, *Industry, *Automation, Production, Processing, Design.) (USSR, Translations, Technological intelligence.)

Mechanization and automation of the Soviet rubber industry and progress achieved in this direction are discussed. Significant shortcomings presented are: (1) inadequate information on the activities of scientific research and design institutes and poor coordination of scientific research and experimental design studies; (2) the hampering of serial production of new machinery

by delays in the production and acceptance testing of experimental models; (3) the poor organization of the production of accessories, such as instruments, pickups, fittings, and drives; (4) the absence of experimental facilities in machinery plants; and (5) the lag in studies on the mechanization of loading-unloading operations, where manual labor is still used. (Author)

AD-267 943 Div. 26, 17
(TISTM/EJH) OTS price $2.60

Propellex Chemical Div., Chromalloy Corp., Edwardsville, Ill.
A STUDY OF EXPLOSIVE FORMING SELECTED REFRACTORY METALS.
Progress rept. no. 3, 1 Sep-31 Oct 61.
15 Nov 61, 19p. incl. illus.
(Contract NOw 61-0832-c)
Unclassified report

DESCRIPTORS: (*Refractory materials, Heat resistant alloys, Tungsten, Molybdenum alloys, Niobium alloys, Drawing (Machine processing), *Explosive forming, Forging, Analysis, Instrumentation.) (*Tungsten, Sheets, Deformation, Measurement, Voltage.)

Methods of investigating explosive forming of selected refractory metals to optimize the strain rate conditions are discussed. An approach involving the production of a DC voltage directly proportional to the forming velocity of metal blank was studied. The output voltage is measured and interpreted in terms of metal velocity, reaction time, and strain rate. A draw ring modification to the 4-in. cup die afforded better understanding of preform size and the achievement of deeper draws with less thinning and elongation than before. All draw ring work was completed with investigation of draw ring pressure. Elongation data of W plates was obtained after Cu plating the metal.

AD-267 958 Div. 26, 22
(TISTM/EJH) OTS price $.75

Watertown Arsenal Labs., Mass.
EFFECT OF TIN AND SILICON ADDITIONS IN COLD EXTRUDING CARBON STEEL.
Report on Research of Metals and Nonmetallic Materials for Ordnance Construction,
by Eugene DiCesare. Nov 61, 23p. incl. illus. tables (Technical rept. no. WAL TR 310.22/1)
Unclassified report

DESCRIPTORS: (Projectiles, *Steel, *Extrusion, Processing, Additives, Chemical impurities, Silicon, Tin, Mechanical properties, Hardness.)

A study was made of the effect of Si and Sn additions in cold extruding carbon steel. As-cast ingots were forged and machined into blanks and extruded in two stages into the 20mm shell body M-97. The evaluation was based on visual, microexaminations, and macroexaminations of the extrusions and on calculations of work and efficiency. The work of extrusion was proportional to the hardness of the alloy. An increase in Si content increased the work required for extrusion, but a poor correlation was noted between tin content and work of extrusion. Internal defects noted in the extrusions were attributed to defects in the cast ingot. (Author)

AD-268 015 Div. 26, 17
(TISTM/TCG) OTS price $ .75

National Northern Div., American Potash and Chemical Corp., West Hanover, Mass.
EXPLOSIVE WELDING.
Rept. for Jan 60-Jan 61 on Metallic Materials,
by Vasil Philipchuk. Aug 61, 15p. incl. illus.
(Contract AF 33(616)6797, Proj. 7351)
(ASD TR 61-124) Unclassified report

DESCRIPTORS: (*Welding, *Explosive forming, Production, Test methods.) (Welded joints, Sheets, Steel, Titanium alloys, Molybdenum alloys.)

Methods were developed for the successful welding of 4340 Steel to 4340 Steel, 6 Al-4V Titanium to 6 Al-4V Titanium, and Molybdenum to 310 Stainless Steel by utilizing explosive forces. No success was achieved in attempts to weld B120 VCA Titanium to B120 VCA Titanium and Mo to Mo. Test specimens were in sheet or strip form. All welds were lap-type, with one piece of metal directly over or lapped over the other. Successful welds of the above three metal combinations indicate that explosive forces can be utilized for lap weldments of sheet metals when the proper test parameters and techniques have been investigated and developed. (Author)

AD-268 052 Div. 26, 17
(TISTM/REB) OTS price $1.10

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
A BEARING ALLOY,
by V. V. Ivanov, K. S. Ignat'yev, and V. A. Senatorov. 1 Dec 61, 1p. (Trans. no. FTD-TT-61-262 of Byulleten' Izobreteniy, Patent No. 134086, pp. 52, 1960)
Unclassified report

DESCRIPTORS: (*Bearings, Materials, Alloys, Bismuth alloys, Lead alloys.) (Translations, USSR.)

A bearing alloy containing 30% bismuth and 70% lead is described. Sleeve bearings with bushings made of this alloy, coupled with the bushings on a shaft made of 1Kh18N12 steel, for example, when lubricated with 12% sulfuric acid or 36% phosphoric acid with a specific pressure of 3 to 4 kg/sq cm and increased revolutions (up to 3000 rpm), had high corrosion resistance, good running-in, and assured relatively long operational efficiency. (Author)

AD-268 082 Div. 26, 17, 12
(TISTM/EJH) OTS price $1.60

Defense Metals Information Center, Columbus, Ohio.
REVIEW OF RECENT DEVELOPMENTS IN THE TECHNOLOGY OF TUNGSTEN,
by V. D. Barth. 24 Nov 61, 9p. incl. tables, 13 refs. (DMIC memo. no. 130)
Unclassified report

DESCRIPTORS: (Refractory materials, Heat resistant alloys, *Tungsten, *Tungsten alloys, Processing, Casting, Forging, Heat treatment, Extrusion, Mechanical properties, Tensile properties, Oxidation, High temperature research, Low temperature research.) (Sheets, Metallic textiles, Production, Powder metallurgy.) Airframes.

This memorandum briefly reviews a number of current developments of general interest in the technology of tungsten. Most of this information was received during the period Aug through Oct 1961. Included in the discussion are: procedures for making W sheet; extrusion; annealing of W foils; fiber metallurgy; fabrication of W and W alloy single crystals; W alloys; and oxidation of W. (Author)

27. PROPULSION SYSTEMS

AD-267 134 Div. 27, 22
(TIPTA/LSK) OTS price $3.60

AeroChem Research Labs., Inc., Princeton, N. J.
ON GUNS FOR SPACE PROPULSION,
by John B. Fenn. Feb 61, 32p. illus. (Technical publication no. 25)
(Contract Nonr-277300)
Unclassified report

DESCRIPTORS: (*Guns, Heat engines, *Space flight, Propulsion, Specific impulse, Mathematical analysis, Theory, Mathematical prediction, Effectiveness.)

A speculative comparison of guns and rockets as propulsive devices indicates that guns deserve careful consideration under some circumstances. Their prospective advantages derive from the possibility of higher thermal efficiencies than rockets can provide. There are also substantial gains consequent to a gun's indifference to the composition of its projectiles. For some space missions which would seem to require a specific impulse in the range up to two thousand, gun systems might be strongly competitive with thermal rockets. Further study and more precise and specific analyses seem indicated. (Author)

AD-267 135 Div. 27, 25, 9
(TISTA/SEB) OTS price $2.60

AeroChem Research Labs., Inc., Princeton, N. J.
THE USE OF A LOW TEMPERATURE, NONEQUILIBRIUM PLASMA JET AS A PLASMA SOURCE FOR ADVANCED PROPULSION SYSTEMS. A FEASIBILITY STUDY,
by J. B. Wilkinson. Mar 61, 13p. illus. 19 refs.
(Technical publication no. 34)
(Contract Nonr-277300)
Unclassified report

DESCRIPTORS: (*Electric propulsion, *Tonirockets, Plasma physics, Magnetohydrodynamics, Low temperature research, Plasma jets, Electrical discharges, Ion sources, Gas ionization, Supersonic flow, Hypersonic flow, Electrical properties, Dissociation, Recombination reactions, Ion accelerators, Theory, Feasibility studies.) Wind tunnels.

A low temperature nonequilibrium plasma jet facility was studied as a plasma source for space propulsion systems and found to be a much more efficient means of utilizing electrical energy to produce a plasma than the conventional plasma arc jet. Ion loss mechanisms in the jet stream are discussed. Preliminary ion decay measurements lead to the conclusion that the faster ion-loss mechanism (dissociative recombination) is not operative and that the dominant loss mechanism is by diffusion and thus will become less significant as the jet diameter is increased. Attempts to set up a BxJ accelerator channel around the plasma jet have been made, but the results obtained were inconclusive. (Author)

AD-267 220 Div. 27, 14, 12
(TISTM/EJH) OTS price $1.60

General Electric Co., Cincinnati, Ohio.
FABRICATION OF PYROLYTIC GRAPHITE ROCKET NOZZLE COMPONENTS.
Progress rept. Aug-Sep 61,
by D. J. Shipp. 3 Oct 61, 9p. (Rept. no. DM61-294)
(Contract NOw 61-0161-c)
Unclassified report

DESCRIPTORS: (*Rocket motor nozzles, Refractory materials, Refractory coatings, *Graphite, Production, Manufacturing methods, Machining, Failure (Mechanics).)

Eleven furnace runs were made. From these runs two ABL Polaris A3 Entrance Caps were processed successfully and shipped. Of the 3 runs made to produce ARC subscale IRIS inserts, 2 were found to be damaged upon removal from the furnace. The other is still in process. Two furnace runs to produce the free standing second stage Polaris A3 throat inserts were successfully made. One of the parts was damaged during finish machining. A new procedure was established and will be used in finish machining of the remaining part. From the remaining furnace runs three ABL and four ARC subscale inserts were produced successfully. (Author)

AD-267 236 Div. 27, 25
(TISTA/SEB) OTS price $2.60

Republic Aviation Corp., Farmingdale, N. Y.
ELECTROMAGNETIC ACCELERATION OF PLASMA FOR SPACE PROPULSION,
by A. Schock. Aug 59, 20p. incl. illus. table.
(Rept. no. PPL-118)
(Contract AF 49(638)552)
Unclassified report

DESCRIPTORS: (*Electric propulsion, Ion rockets, Magnetohydrodynamics, Plasma physics, Ions, Ion accelerators, Venturi tubes, Dynamics, Tests, Test methods, Theory.)

Four methods are described for analyzing the dynamic behavior of plasma accelerators: the gas-dynamic, the snow-plow, the free particle, and the slug model. The latter method is examined in detail, and it is demonstrated that approximate solutions exist which aid in predicting the effect of various parameters on performance. The use of this analytical model in designing the system and the mode of operation can lead to favorable efficiencies in converting electrical to kinetic energy. (Author)

AD-267 304 Div. 27
(TISTA/VGW) OTS price $1.50

National Aeronautics and Space Administration, Washington, D. C.
BASE FLOW CHARACTERISTICS FOR SEVERAL FOUR-CLUSTERED ROCKET CONFIGURATIONS AT MACH NUMBERS FROM 2.0 TO 3.5,
by Norman T. Musial and James J. Ward. Dec 61, 55p. incl. illus. table (NASA Technical note D-1093)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note D-1093.

DESCRIPTORS: (Liquid rocket propellants, *Rocket motors, *Engine clusters in Cylindrical bodies, *Rocket motor nozzles, Configuration, Model tests.) (Exhaust gases, Gas flow, Aerodynamics, Wake, Pressure, Temperature, Heating, Heat production, Heat transfer.) (Conical bodies, Cylindrical bodies, Supersonics.)

A generalized study of base flow phenomena was conducted with four 500-pound-thrust JP-4 fuel - liquid-oxygen rocket motors installed in the base of a 12-inch-diameter cylindrical model. Data were obtained over a Mach number and nozzle pressure ratio range of 2.0 to 3.5 and 340 to 6800, respectively. Base heat flux, gas temperature, and pressure were highest in the center of the cluster core and decreased in a radial direction. Although a maximum heat flux of 93 Btu per square foot per second was measured within the cluster core, peripheral heat fluxes were low, averaging about 5 Btu per square foot per second for all configurations. Generally base heat flux was found to be independent of Mach number over the range investigated. Base heat flux within the cluster core was decreased by increasing motor spacing, motor extension, a combination of increasing nozzle area ratio and decreasing exit angle, and gimbaling the two side engines. Small amounts of nitrogen injected within the cluster core sharply reduced core heat flux. (Author)

AD-267 306 Div. 27
(TISTA/SEB) OTS price $.75

National Aeronautics and Space Administration, Washington, D. C.
PERFORMANCE OF SMALL (100-LB THRUST) ROCKET MOTORS USING COAXIAL INJECTION OF HYDRAZINE AND NITROGEN TETROXIDE,
by Joseph F. Wasserbauer and William Tabata. Dec 61, 27p. incl. illus. tables (NASA Technical note no. D-1162)
Unclassified report

Also available from NASA, Wash. 25, D. C., as NASA Technical note no. D-1162.

DESCRIPTORS: (*Satellite attitude, *Satellite rendezvous vehicles, *Rocket motors, Liquid rocket propellants, Combustion chambers, Fuel injectors, Design, Combustion, Thrust, Tests.) (Hydrazine, Nitrogen compounds, Tetroxides.)

An investigation was conducted on a small (approximately 100-lb thrust) rocket using coaxial injection of N_2H_4 and N_2O_4. Characteristic-velocity efficiencies of 94% of the theoretical shifting equilibrium value were obtained at a chamber pressure of about 300 psi using a 21-tube injector and a combustion chamber characteristic length of 10 inches. Performance at lower chamber pressures could be improved by reducing contraction ratio and thereby increasing the combustion chamber length and injector pressure drop, which would tend to promote better mixing. Calculations based on experimental data showed a vacuum specific impulse of 305 sec. with a nozzle area ratio of 50. (Author)

AD-267 313 Div. 27, 30, 12
(TISTE/CRJ) OTS price $2.60

Aerojet-General Corp., Sacramento, Calif.
ULTRASONIC INSPECTION OF POLARIS LINER AND INSULATION BOND QUALITY,
by A. P. Rogel and R. J. Lambird. 20 May 59, 8p. illus. (Technical memo no. 114 SRP)
Unclassified report

DESCRIPTORS: (*Guided missiles, Underwater to surface, Surface to surface, *Rocket motors, *Combustion chamber liners, Bonding, Test methods, *Test sets.) (Rocket motors, Solid rocket propellants, Combustion chamber liners, Test equipment, Reflectoscopes, Ultrasonics.)

A Sperry Model UR Reflectoscope was successfully used to determine the quality of the bonds between the insulation-chamber interface and the liner-chamber interface of Polaris rocket motors. The inspection method utilizes ultrasonic vibrations that are transmitted into the motor case and are reflected at an unbonded steel-to-liner or steel-to-insulation interface, or are largely absorbed at a bonded interface. (Author)

AD-267 458 Div. 27, 12
(TISTE/CDM) OTS price $12.50

Bell Aerosystems Co., Buffalo, N. Y.
SMALL ROCKET LIFT DEVICE. PHASE II. TESTING OF THE ASSEMBLED UNIT,
by Wendell F. Moore. July 61, 171p. incl. illus. tables.
(Contract DA 44-177-tc-642)
(TCREC TR 61-123) Unclassified report

DESCRIPTORS: (*Military personnel, Flight, *Transportation, *Rocket propulsion, Liquid rocket propellants, Tests.) (Manned, Flight testing, *Rockets.) (*Human engineering, *Military transportation, Propellant tanks, Mobile, Gas generating systems, Reliability, Lift, Thrust, Stability.)

The concept of attaching a rocket propulsion system to a man for transporting him from one place to another was successfully demonstrated. This was done by rigorous static testing of the propulsion system, a manned tethered flight program during which various improvements were incorporated, and finally by a manned free-flight program of various types of maneuvers. Additional quantitative data on stability and control is needed to intelligently establish prototype specifications. Hydrogen peroxide, although very successfully utilized, would have a limited tactical use due to its handling characteristics and limitations at low ambient temperatures. A better tactical propellant must be found. The basic concept of distributing the SRLD static weight around the man's body by means of a padded Fiberglas corset proved highly successful. Lifting a man under the arms for a short period of time had no deleterious effects and permits excellent kinesthetic control. (Author)

AD-267 465 Div. 27, 9
(TISTP/TL) OTS price $3.60

Naval Ordnance Test Station, China Lake, Calif.
THRUST VECTORING. SHOCK-WAVE AND PRESSURE EFFECTS OF COLD-AIR INJECTION INTO A TWO-DIMENSIONAL NOZZLE,
by L. T. Bankston and G. G. Barnes. Jan 61, 28p. incl. illus. tables (NOTS TP 2608) (NAVWEPS rept. no. 7611)
Unclassified report

DESCRIPTORS: (*Nozzles, *Supersonic nozzles, *Shock waves, Pressure, Air, *Injection, Tests.) (*Supersonic flow, Spark shadowgraph photography, Subsonic flow, Transducers, Theory.) (Integral equations, Differential equations.)

Experiments were done in which a small stream of cold air was injected into the Mach 1.86 section of a two-dimensional, glass-walled nozzle having a 1.0- by 0.3-inch rectangular throat. Shadowgraphs of resultant shocks were taken and

wall pressures in the nozzle measured. Mainstream stagnation pressure was fixed at 500 psig; injectant stagnation pressure was varied from 125 to 1,000 psig. Shock-wave angle increased with increasing injectant pressure. Theoretical calculations of change of transverse momentum flux across an oblique circular-cylindrical shock and across an oblique plane shock were completed, and results presented include formulas and graphs. (Author)

AD-267 498 Div. 27
(TISTA/SEB) OTS price $2.10

Little, Arthur D., Inc., Cambridge, Mass.
RAPID, HIGH-PRESSURE TRANSFER OF LIQUID OXYGEN WITHIN A SYSTEM IMMERSED IN LIQUID NITROGEN.
1 Sep 59, 72p. incl. illus. tables (Special rept. no. 105; C-59879)
Unclassified report

DESCRIPTORS: (Rocket oxidizers, Liquefied gases, *Oxygen, Transportation, Handling under Pressure of Liquefied gases, Nitrogen.) (*Fuel systems, Design, High pressure research, Test methods, Test equipment, Cryogenics, Theory, Mathematical analysis, Tests.).

A small cryogenic transfer system was constructed and tested with liquid O and liquid N. Transfer pressures were varied between 50 and 450 psig. The test tanks were immersed in a vented tank of liquid nitrogen so that liquid oxygen could be transferred in a sub-cooled thermodynamic state. Tests were carried out in which (a) an empty tank was pressurized and the pressure was then held for one minute, (b) a tank full of liquid was pressurized and liquid transferred to a receiver tank within one minute. Gas requirements and tank temperatures and pressures were measured in each test. Estimates of the condensed gas and the residual cold gas were made from material-balance calculations. In one run, liquid O was pressurized and transferred with N gas. Samples of liquid O were taken in the receiver tank and analyzed for inert contamination. No contamination of the transferred O was noted. An analytical model is proposed for calculating the rate of heat transfer to the walls and liquid. The heat-transfer estimation was combined with an equivalent mass concept derived from thermodynamics to yield estimated values of gas comsumption. The calculated values of pressurization gas requirements for all runs were with ± 15% of experimental values. (Author)

AD-267 500 Div. 27, 26, 17
(TISTM/TCG) OTS price $1.10

Rolla Metallurgy Research Center, Bureau of Mines, Mo.
VAPOR DEPOSITION OF TUNGSTEN AND THE EFFECTS OF PROCESS VARIABLES.
Monthly progress rept. no. 1,
by F. W. Hoertel. Nov 61, 3p.
Unclassified report

DESCRIPTORS: (*Rocket motor nozzles, *Vapor plating, *Metal coatings, Metallic smoke deposits, Refractory materials, *Tungsten, Vapors from Tungsten compounds, Fluorides on Beryllium compounds, Oxides, Graphite, Nozzles, Processing, Manufacturing methods, Fracture (Mechanics), Corrosion.)

Experimental work on W-coating rocket nozzles inserts was continued by studying the effects of W vapor-deposition variables. Six W cylinders were vapor-deposited at different temperatures under atmosphere pressure, and constant ratio and flow rate of reactant gases. Arrangements were made to W-coat a graphite model of a W-beryllia nozzle insert to determine suitable time of deposition and flow rate of the reactant gases.

AD-267 810 Div. 27, 12
(TISTE/RD) OTS price $1.10

Naval Research Lab., Washington, D. C.
INSPECTION OF HYDROTEST FAILURE OF RH 449 ON 9 NOVEMBER 1961,
by F. R. Fahland. 24 Nov 61, 4p. incl. illus. (Technical memo. no. 178)
Unclassified report

DESCRIPTORS: (Guided missiles, Underwater to surface, Rocket propulsion.) (*Combustion chambers of Glass textiles, Failure (Mechanics), Tests, Rocket motors.)

AD-267 811 Div. 27, 14
(TISTM/REB) OTS price $1.10

Naval Research Lab., Washington, D. C.
NONMETALLIC MATERIALS FOR NAVAL WEAPONS SYSTEMS,
by H. O. Ewing and J. A. Kies. 28 Nov 61, 2p. incl. illus. (Technical memo. no. 180)
Unclassified report

DESCRIPTORS: (*Rocket cases, *Pressure vessels, Plastics, Glass textiles, *Filament wound construction, *Failure (Mechanics), Test methods, Measurement, Tests.)

A method was developed for measuring resistance to the splitting and unwinding typical of some failures in the outer hoop-wound layers of fiberglass pressure vessels. Tests were made of hoops containing either side notches or surface cuts normal to the winding direction. For the side notched hoops and where K sub c is the familiar Irwin toughness parameter, K sub c squared equals sigma squared 1/2. Here l is the depth of the side notch and sigma is the nominal or mass hoop stress at which splitting occurs. The split propagates in the hoop direction. For surface notched hoops under tension, K sub c squared equals sigma squared/2 times c/P, where c is the cross section cut and P is the submerged perimeter of the cut. Cutting wheels of 0.25-in. and 0.510-in. radius were used. (Author)

AD-267 887 Div. 27, 12, 30
(TISTE/RD) OTS price $2.60

Naval Radiological Defense Lab., San Francisco, Calif.
DYNAMIC FLAW DETECTION USING PENETRATING RADIATION AND SCINTILLATION DETECTION,
by K. F. Sinclair and G. W. Hitchcock. 10 Oct 61, 32p. incl. illus. (Rept. no. NRDL TR-534)
Unclassified report

DESCRIPTORS: (*Rocket motors, Solid rocket propellants, *Quality control, Test methods, Non-destructive testing, Test equipment.) (Guided missiles, Rocket propulsion, Rocket motors, Rocket propellants, Errors.) (Test equipment, X-ray generators, Scintillation counters, Crystal detectors, Phototubes, Amplifiers.) (Rocket motors, *Fracture (Mechanics), Detection of Failure (Mechanics) during Combustion.)

The design and performance of continuous scan type flaw detection systems are presented for use in the detailed examination of solid propellant missile motors. Factors affecting performance are discussed individually and related in a system equation. An experimental system, using two scintillation detectors in a differential configuration, is described and tests performed using isotopic and X-ray sources are reviewed. The predicted performance and the experimental results obtained are compared. (Author)

28. PSYCHOLOGY AND HUMAN ENGINEERING

AD-267 153 Div. 28, 23, 18 5
(TISTB/MS) OTS price $19.75

Army Research Office, Office of the Chief, Research and Development, Washington, D. C.
SEVENTH ANNUAL ARMY HUMAN FACTORS ENGINEERING CONFERENCE, 3-6 OCTOBER 1961, U. S. ARMY SIGNAL CORPS PROJECT MICHIGAN, UNIVERSITY OF MICHIGAN, ANN ARBOR, MICHIGAN.
1 Nov 61, 333p. incl. illus. tables, 49 refs.
Unclassified report

DESCRIPTORS: (*Human engineering, Conferences, Symposia, *Communication systems, Combat information centers.) (*Human engineering, *Military training, *Training, Motor reactions, *Army operations, Attention, Display systems, Weapons.) Management engineering, Teaching machines, *Aviation accidents.

AD-267 223 Div. 28
(TISTB/MS) OTS price $5.60

Human Resources Research Office, George Washington U., Washington, D. C.
A SURVEY AND ANALYSIS OF VIGILANCE RESEARCH,
by Bruce O. Bergum and I. Charles Klein. Nov 61, 50p. incl. illus. table, 89 refs. (Research rept. no. 8)
(Contract DA 44-188-ARO-2, Proj. OJ 95 50 001)
Unclassified report

DESCRIPTORS: (*Attention, Visual signals, Auditory signals, *Visual perception, Auditory perception, Behavior, Human engineering, Display systems.) (*Attention, Theory.) (*Reaction (Psychology), Reaction time, Theory.)

Empirical data drawn from a survey of the research literature on vigilance behavior are presented in terms of the effects on vigilance of variables discussed under the groupings of task, environmental, and motivational factors. The adequacy of current interpretations of vigilance data is considered for three classes of theories: conditioning, expectancy, and motivation. Approaches to the solution of the vigilance program are discussed in terms of anticipated technological developments, and areas of research on monitoring problems associated with air defense systems are suggested. (Author)

AD-267 286 Div. 28
(TISTB/MS) OTS price $8.10

Psychological Research Associates, Arlington, Va.
METHODS FOR CHANGING CONSUMER ATTITUDES. A REPORT OF THREE EXPERIMENTS.
Rept. no. 1 (Final) 13 June 60-12 June 61 on Shaping User Acceptance of Innovation,
by Ewart E. Smith. Feb 61, 85p. incl. tables. (PRA rept. no. 61-2)
(Contract DA 19-129-qm-1619, Proj. 7-84-15-007)
Unclassified report

DESCRIPTORS: (*Foods, *Grasshoppers, *Meat, *Coffee, Attitudes, Conditioned reflex, Countermeasures, Psychometrics, Test methods.)

Three experiments were performed to develop and test methods for changing consumer food attitudes. Primary emphasis was on the use of cognitive dissonance. This is a method whereby subjects are induced, by a positive or negative reward, to engage in behavior, e.g. eating a disliked food, which is contrary to their current attitudes. The discrepancy between their attitudes and their inconsistent behavior produces a conflict which, under the proper conditions will, theoretically, produce a change in their attitude. In the first experiment, large changes in attitude towards the use of grasshoppers as a food were produced by a cognitive dissonance technique. The use of a no influence attempt technique in conjunction with a rationale also produced attitude change. In the second experiment, using irradiated meat, the no influence attempt technique was found to be effective without a rationale, but to be more powerful when used with a rationale. In the third experiment, significant changes in attitudes towards instant coffee were produced, but an attempt to extend the range of the powerful cognitive dissonance technique was not successful. (Author)

AD-267 388 Div. 28
(TISTB/MS) OTS price $7.60

Dynamic Analysis and Control Lab., Mass. Inst. of Tech., Cambridge.
ON HUMAN ADAPTIVE STRATEGY IN AN UNPREDICTABLE ENVIRONMENT
by Peter Briggs. Aug 61, 71p. incl. illus. tables (Rept. no. DSR 8055-3)
(Contract AF 19(604)4548)
(ESD-TR-61-41) Unclassified report

DESCRIPTORS: (*Behavior, Learning, Test methods.) (*Human engineering, Probability, Mathematical analysis.) (Mathematical analysis, Mathematical prediction, Probability.) Adjustment (Psychology).

The interaction between human subjects and environment is studied in detail. The task is a hill-climbing problem in which the hill is simply a randomly pivoting ramp function. The human varies two quantities, x sub 1 and x sub 2, while he observes changes in a third quantity z. Constraints are imposed upon the manipulation of x sub 1 and x sub 2, and upon the slope and possible orientation of the ramp; also, transition probabilities are introduced which govern the rotation of the ramp from one orientation to another. Assumptions concerning the mechanism of human choice behavior in this situation lead to the development of a single-parameter stochastic behavioral model. The expected performance of the model is compared with the experimentally determined average performance of human subjects. The results indicate that human adaptive strategy is essentially stochastic but is

better described by a three-parameter model than by a single-parameter model; and certain non-stochastic elements in human adaptive strategy enable human subjects to consistently exceed the performance of both the single- and three-parameter stochastic models by a small margin, especially in highly variable environments. (Author)

AD-267 485 Div. 28, 16, 15
(TISTB/CCH) OTS price $2.60

Utah U., Salt Lake City.
VARIABLES RELATED TO ACCURACY IN INTERPERSONAL PERCEPTION.
Annual rept. no. 4,
by Victor B. Cline and James M. Richards, Jr.
15 Nov 61, 23p. incl. tables, 13 refs.
(Contract Nonr-128804)
Unclassified report

DESCRIPTORS: (Complex variables in Visual acuity of *Perception, *Reasoning, Social communication and Group dynamics by Training films, Motion pictures.) (Tests, Achievement tests, *Behavior, Statistical analysis, Errors.)

Results of a continuing investigation of the general area of accuracy of interpersonal perception are presented. A special procedure, used in the individual studies, involves presenting standard stimulus persons through means of sound-color movies of a spontaneous interview. Heterogeneous groups of subjects (or judges) view the films, and make a variety of judgements about the behavior, attitudes, and feelings of the persons seen (in the films). One group of Ss made their judgments after viewing the soundcolor movies, a second group made judgments knowing only the sex, age, marital status, and number of children of the stimulus persons, and a third group knew only that the person whose responses they were predicting was an adult male or female. The last two groups, therefore, made their judgments on the basis of stereotypes. Results for Interpersonal Accuracy z and Total Error Score indicate that Ss in the first group were significantly superior both at rank ordering the stimulus persons in terms of their acceptance of conventional religion and predicting exactly the responses of the stimulus persons. Results for Interpersonal Accuracy Variance indicate that differentiation among stimulus persons increases as the amount of information provided about them increases. (Author)

AD-267 533 Div. 28, 15, 32
(TISTB/CCH) OTS price $1.60

New York U., N. Y.
KINDS OF CATEGORIES AND CLUSTERING IN FREE RECALL.
Technical rept. no. 5 on Learning, Retention and Recovery of Meaningful Material,
by George R. Marshall and Charles N. Cofer.
July 61, 6p. incl. illus. tables.
(Contract Nonr-28547)
Unclassified report

DESCRIPTORS: (*Statistical distributions in Language and *Vocabulary in *Memory and Verbal behavior.) Learning.

Two experiments involving the clustering of nouns in the category clustering situation are described. In one, the breadth of categories and, in the other, the abstract-concrete dimension of categories were studied. Narrow categories were more conducive to clustering than broad ones, an effect due mainly to very strong clustering in one of the narrow categories. No significant differences were found in clustering on the basis of concrete and abstract categories but, as in the case of category breadth, variability in the extent of clustering for the different categories within the abstract and concrete sets was substantial. (Author)

AD-267 534 Div. 28
(TISTB/CCH) OTS price $1.60

New York U., N. Y.
FURTHER STUDIES OF CLUSTERING IN THE RECALL OF NOUNS EMBEDDED DURING PRESENTATION IN SENTENCES.
Technical rept. no. 2 on Learning, Retention and Recovery of Meaningful Material,
by Charles N. Cofer. July 61, 7p. incl. table.
(Contract Nonr-28547)
Unclassified report

DESCRIPTORS: (*Vocabulary, Learning and Training, Tests.) (*Language, Verbal behavior, Errors.) *Memory.

An experiment was carried out which, with modifications in procedure, was in part an essential repetition of an earlier one. Noun clustering in recall was studied as a function of sentence context during presentation. As compared with suitable controls, the clustering in recall of strongly clustering, categorized nouns was found to be adversely affected by the sentence context. This was in agreement with the earlier experiment. An attempt was made to accentuate the sentence context factor by reducing the category clustering tendency of the nouns employed. This was done by using nouns of weak category clustering tendency. (Author)

AD-267 546 Div. 28
(TISTB/MS) OTS price $3.60

Washington U., St. Louis, Mo.
AUTHORITARIANISM AND POWER CUES,
by Edward J. Wilkins and Richard deCharms.
Sep 61, 32p. incl. tables (Technical rept. no. 12)
(Contract Nonr-81611)
Unclassified report

DESCRIPTORS: (*Personality, Behavior, *Group dynamics, Sociometrics, Needs, Attitudes, Theory.)

The relationship between authoritarianism of the subject and his reactions to standard stimulus persons presented to him was investigated. The stimulus persons differed as to the types of power or status they appear to possess. Internal power cues were manipulated through forcefulness and decisiveness of speech. External cues were manipulated by the stimulus person's reported socio-economic status. The subjects' accuracy of perception, acceptance, and free description of the stimulus person constituted the dependent variables. The results generally support the theoretical position that high authoritarians are not necessarily more sensitive to external power cues, but are more influenced by them in making inferences about other persons. Low authoritarians are not influenced by external power-relevant cues, but use more internal factors in describing others. The data also revealed that subjects tended to distort their reports of their parents' income in a direction

commensurate with that reported for the stimulus person, thus demonstrating a type of invidious comparison. In addition, it was found that subjects from the liberal arts school had lower F-Scale scores than those drawn from the engineering school. Since the subjects were primarily freshman, it appears that the liberal arts school is attracting more liberal students. (Author)

AD-267 547 Div. 28, 32
(TISTB/MS) OTS price $2.60

Washington U., St. Louis, Mo.
THE FRUSTRATION-AGGRESSION HYPOTHESIS: A LINEAR, LOG, OR POWER FUNCTION,
by Robert L. Hamblin. Oct 61, 21p. incl. illus.
(Technical rept. no. 13)
(Contract Nonr-81611)
Unclassified report

DESCRIPTORS: (*Group dynamics, *Sociometrics, *Emotions, Attitudes, *Needs, *Behavior, Theory.)

AD-267 549 Div. 28
(TISTB/MS) OTS price $3.60

Washington U., St. Louis, Mo.
DIRECT AND VICARIOUS VERBAL CONDITIONING,
by Deborah Smith Onkin and Richard deCharms.
Nov 61, 30p. incl. illus. tables, 28 refs.
(Technical rept. no. 15)
(Contract Nonr-81611)
Unclassified report

DESCRIPTORS: (*Verbal behavior, *Conditioned reflex, Learning, Group dynamics.)

This study was designed to explore the phenomena of direct and vicarious verbal conditioning in the laboratory. An attempt was also made to investigate the relationship between awareness on the part of the subject (S) that his responses were reacted to in specific ways by the experimenter, and the S's responses. The results clearly demonstrate direct conditioning of the aware models and a clear effect of withholding reinforcement. Vicarious conditioning of the aware observers was demonstrated by a significant increment in their initial response level over that of the models. (Author)

AD-267 566 Div. 28
(TISTB/MS) OTS price $1.10

Arizona State U., Tempe.
THE RELATIONSHIP OF INTELLIGENCE TEST SCORES TO THE EASE OF LANGUAGE CONDITIONING.
Technical rept. no. 16 on Psychological Processes in Language Communication,
by William G. Heard, Judson R. Finley and Arthur W. Staats. May 61, 9p. incl. illus. table, 10 refs.
(Contract Nonr-279402; In cooperation with the National Inst. of Mental Health, Grant M-2381)
Unclassified report

DESCRIPTORS: (*Language, *Conditioned reflex.) (*Intelligence tests, *Behavior, Measurement, Conditioned reflex.)

A relationship between intelligence test scores and the higher-order conditioning of responses relevant to more complex human behaviors was investigated. The ease with which subjects (Ss) acquired conditioned meaning responses to neutral verbal stimuli (Staats & Staats, 1957) was related to verbal scale scores on the SAT (College Entrance Examination Board Scholastic Aptitude Test). Sixty-four who scored above the upper or below the lower 10 percentile level of their class were individually run in this higher-order language conditioning procedure. Results indicated that the high intelligence test group acquired significantly stronger evaluative meaning responses than did the low intelligence test group, as measured by semantic differential scores. The conditioning of sharp-round meaning was not significantly different for the intelligence groups, although the results were in the expected direction of stronger conditioning for high intelligence test Ss. (Author)

AD-267 567 Div. 28
(TISTB/MS) OTS price $2.60

Arizona State U., Tempe.
OPERANT CONDITIONING OF A CLASS OF NEGATIVE EVALUATIVE MEANING WORDS.
Technical rept. no. 20 on Psychological Processes in Language Communication,
by Arthur W. Staats, Carolyn K. Staats and others. July 61, 24p. incl. illus. tables, 11 refs.
(Contract Nonr-279402; In cooperation with the National Institute of Mental Health, Grant M-2381)
Unclassified report

DESCRIPTORS: (*Language, Conditioned reflex.) (*Vocabulary, Behavior, Conditioned reflex, Measurement.) Reaction (Psychology), Stimulation.

A series of three experiments was conducted to test the hypothesis that a group of words which share a common meaning constitutes a verbal response class. Results showed the experimental words, all of negative evaluative meaning, did condition as a class when individual negative word responses were reinforced. Negative words tended to occur in such low frequency in the procedure of Experiment I that a number of modifications were undertaken in subsequent experiments to insure that such responses would occur in greater frequency, thus allowing for more reinforced trials. In Experiment II the effectiveness of the reinforcer GOOD, a positive evaluative word, was compared to that of a non-verbal reinforcer, points. Both types of reinforcers were shown to bring about significant conditioning of the negative word class. Experiment III demonstrated that the strengthening of the negative word class response was a gradual effect resulting from the systematic presentation of the reinforcer. (Author)

AD-267 568 Div. 28
(TISTB/MS) OTS price $1.60

Arizona State U., Tempe.
OPERANT CONDITIONING OF SERIALLY-ORDERED VERBAL RESPONSES.
Technical rept. no. 19 on Psychological Processes in Language Communication,
by Arthur W. Staats, Carolyn K. Staats, and Judson R. Finley. June 61, 13p. incl. illus. tables, 10 refs.
(Contract Nonr-279402; In cooperation with the National Institute of Mental Health, Grant M-2381)
Unclassified report

DESCRIPTORS: (*Language, Conditioned reflex, *Verbal behavior, *Vocabulary, Stimulation.) *Reaction (Psychology.)

This study investigated the possibility that the existence of serially-ordered word associations is a variable underlying the formation of a word

class; that is, words which are related in a serial order should be strengthened in a situation if the individual responses making up the chain are reinforced. The effect of reinforcement for emitting serially-ordered responses was studied under four treatment conditions, a serial, an alternating, a random, and a control (nonchained) order of presentation. Results indicated that the conditioning was greatest for the serial order of presentation, and declined in a significantly linear fashion as the order of presentation moved systematically from a serial to a random order. No effect was obtained where Ss had not learned the nonsense words as serially-related responses. The number of individual Ss who exceeded chance results, and the percentage of aware Ss within each group, also decreased as the conditions became more unlike the serial order of presentation. Thus word responses that are serially-associated would be expected to operantly condition as a response class. (Author)

AD-267 569 Div. 28
(TISTB/MS) OTS price $3.60

Arizona State U., Tempe.
MEDIATING RESPONSES IN THE OPERANT CONDITIONING OF WORD CLASSES.
Technical rept. no. 21 on Psychological Processes in Language Communication,
by Arthur W. Staats, Carolyn K. Staats and others. Aug 61, 34p. incl. illus. tables, 32 refs.
(Contract Nonr-279402; In cooperation with the National Institute of Mental Health, Grant M-2381)

Unclassified report

DESCRIPTORS: (*Vocabulary, Behavior, Conditioned reflex, *Verbal behavior, *Language.) (*Reaction (Psychology), Stimulation.)

AD-267 590 Div. 28
(TISTB/CCH) OTS price $1.10

Arizona State U., Tempe.
MEANING ESTABLISHED BY CLASSICAL CONDITIONING CONTROLLING ASSOCIATES TO THE UCS.
Rept. on Psychological Processes in Language Communication,
by Arthur W. Staats, Carolyn K. Staats and others. June 61, 4p. incl. table (Technical rept. no. 17)
(Contract Nonr-279402)

Unclassified report

DESCRIPTORS: *Language, Social communication, *Verbal behavior, Measurement, *Vocabulary, Tests.

AD-267 603 Div. 28, 12
(TISTB/CW) OTS price $8.10

Dunlap and Associates, Inc., Santa Monica, Calif.
DEVELOPMENT OF A JOB SAMPLE PROFICIENCY TEST FOR GUIDED MISSILEMEN MAINTAINING THE MARK 15 MOD 0 TARTAR MISSILE.
Research rept. no. 2,
by R. E. Blanchard. 30 June 61, 77p. incl. tables, 18 refs.
(Contract Nonr-297800)

Unclassified report

DESCRIPTORS: (*Aptitude tests for Naval personnel, *Guided missile personnel, *Maintenance personnel, Training, Effectiveness.) Achievement tests.

A preliminary proficiency test was revised on the basis of information obtained during tryout, and on the results of tryout data analysis. Two preliminary subtests were omitted, and five new missile troubleshooting subtests were added. On the revised form the 28 subtests were ordered into eight groups on the basis of functional similarity. The revised test has three subtest alternates and one parallel group of subtests. The revised test will probably require approximately eight hours for complete administration. Research findings relative to utilization of the test, developing proficiency tests on new equipment, and recommendations for further research are discussed. (Author)

AD-267 618 Div. 28, 23
(TISTB/CCH) OTS price $3.60

Psychological Lab., Johns Hopkins U., Baltimore, Md.
SOME CRITERION PROBLEMS IN HUMAN FACTORS RESEARCH,
by Alphonse Chapanis. 3 Aug 60, 35p. incl. illus. 15 refs. (Rept. no. 12)
(Contract Nonr-24855)

Unclassified report

DESCRIPTORS: (*Industrial psychology, *Human engineering, Effectiveness.) (Visual perception, Motor reactions in *Control systems on Design of Training devices, Noise, Anoxia, Climatic factors.) (*Reasoning, Probability, Errors.) *Operations research.

AD-267 644 Div. 28, 30
(TISTB/CCH) OTS price $1.60

National Training Labs., Washington, D. C.
SOME EFFECTS ON GROUP PROBLEM SOLVING OF AN ENFORCED SEPARATION OF PROBLEM-SOLVING STAGES.
Rept. on Factors Determining Defensive Behavior Within Groups,
by Jacqueline Goodchilds, Jacob Schonfield, and Jack R. Gibb. June 61, 17p. incl. tables.
(Technical rept. no. 8; Research reprint Series no. 5)
(Contract Nonr-308800)

Unclassified report

DESCRIPTORS: (*Behavior, Probability, Effectiveness.) (*Group dynamics, *Programming, Computers.) Tests, Measurement.

This study tested the suggestion that adherence to a patterned sequence will have favorable consequences for efficiency and effectiveness of a problem-solving experience. Untrained subjects voluntarily can change their problem-solving behaviors drastically, that they react positively and enthusiastically to the novel experience, and report greater commitment to their group's answers. There is no evidence that formalized separation of stages of the unpatterned normal condition differs in producing a greater number of quality of ideas when using the kinds of problems and conditions utilized. A question is posed by the imbalance between the experimental subjects' positive feeling tone and lack of a commensurate high-performance record. With experience with the new procedure, would this imbalance be resolved in favor of a high level of actual as well as perceived performance, or would the early positive reaction wear off as the novel became familiar. The evidence suggests that reported positive effects of brainstorming and other separation methods -- if such positive effects exist -- are not due to separation, per se, but to some other factor such as threat reduction, artificial goads to productivity, or an induced idiosyncrasy norm. (Author)

Division 28 - PSYCHOLOGY AND HUMAN ENGINEERING

AD-267 645 Div. 28
(TISTB/CW) OTS price $2.60

National Training Labs., Washington, D. C.
GROUP EFFECTS ON PERCEPTUAL BEHAVIOR.
Rept. on Factors Determining Defensive Behavior Within Groups,
by Dorothy Stock. July 61, 21p. 22 refs. (Technical rept. no. 10; Research reprint series no. 7)
(Contract Nonr-308800)
Unclassified report

DESCRIPTORS: (*Group dynamics, *Perception, *Reasoning, Sociology, Personality.)

Group influences on individual perception are most likely to operate when the object of the perception is complex or ambiguous or both. Much of everyday social perception involves making judgments about the psychological or social characteristics of oneself, of other persons, or of groups. Such perceptual objects are inherently complex, and perceptions about them are susceptible to group influence. The individual will make use of the perceptions of others to help structure his own, but the perceptions of another person must make sense to an individual before he can use them to shape his own perceptions. For a group as a whole, the shared perceptions which develop may function to deal with difficult situations presented to a group by its environment. The group situation can influence the perceptions of individuals by providing the medium in which cues about the perceptual object are expressed; by providing standards which the individual can use to structure an ambiguous or complex perceptual object; by suggesting that certain elements of a perceptual object are relevant, while others are less relevant; by affecting the individual's ability to recognize and utilize cues about the perceptual object; and by constituting the interpersonal milieu in which shared perceptions are produced and maintained. (Author)

AD-267 650 Div. 28, 15
(TISTB/CCH) OTS price $5.60

Department of the Navy, Washington, D. C.
SOME THOUGHTS ON A SCIENCE OF VALUES,
by I. Heller. Mar 61, 49p.
Unclassified report

DESCRIPTORS: (*Reasoning on *Probability, *Functions, Test methods.) Mathematical prediction, Theory.

AD-267 658 Div. 28
(TISTB/MS) OTS price $1.10

New York U., N. Y.
SOME EFFECTS OF MODIFIERS ON THE CLUSTERING OF NOUNS EMBEDDED DURING PRESENTATION IN SENTENCES.
Technical rept. no. 6 on Learning, Retention, and Recovery of Meaningful Material,
by Charles N. Cofer. July 61, 6p. incl. tables.
(Contract Nonr-28547)
Unclassified report

DESCRIPTORS: (*Vocabulary, *Learning, Memory, *Verbal behavior, Measurement.)

Subjects were asked to recall nouns which, during presentation, were embedded in sentences. In the sentence group the nouns were not modified by adjectives, but in the other three groups they were. In these three groups the adjectives were arranged to fit the specificity condition in one, the conflict condition in another, and the facilitation condition in the third, all as defined by Gonzaez and Cofer (J. Genet. Psychol., 95, 293-320). Interest was focused on whethe these adjective arrangements would work in the sentence context as they seem to work in adjective-noun pairs. The facilitation condition seemed to show the best noun recall. The specificity condition appeared to perform least well on noun-category clustering. The conflict group was slightly superior to the sentence (control) group on several performance measures. (Author)

AD-267 660 Div. 28
(TISTB/MS) OTS price $1.60

New York U., N. Y.
ASSOCIATIVE, CATEGORY, AND SET FACTORS IN CLUSTERING AMONG WORK PAIRS AND TRIADS.
Technical rept. no. 4 on Learning, Retention and Recovery of Meaningful Materials,
by George R. Marshall and Charles N. Cofer. July 61, 9p. incl. illus. tables, 16 refs.
(Contract Nonr-28547)
Unclassified report

DESCRIPTORS: (*Vocabulary, *Learning, Memory, *Verbal behavior, Measurement.)

AD-267 778 Div. 28
(TISTB/MS) OTS price $4.60

Personnel Lab., Aeronautical Systems Div., Lackland Air Force Base, Tex.
RECURRENT PERSONALITY FACTORS BASED ON TRAIT RATINGS,
by Ernest C. Tupes and Raymond E. Christal. May 61, 40p. incl. tables, 18 refs.
(Proj. no. 7717)
(ASD TR 61-97) Unclassified report

DESCRIPTORS: (*Personality, Behavior, *Military training, *Factor analysis.) (*Personality, Personality tests, Aviation personnel.)

Intercorrelations among ratings on 35 personality traits, selected as representative of the personality domain, were obtained for eight samples. These samples differed in length of acquaintanceship from three days to more than a year; in kind of acquaintanceship from assessment programs in a military training course to a fraternity house situation; in type of subject from airmen with only a high school education to male and female undergraduate students to first-year graduate students; and in type of rater from very naive persons to clinical psychologists and psychiatrists with years of experience in the evaluation of personality. Centroid or multiple-group factors were extracted and rotated orthogonally to simple structure. For one study, an independent solution was obtained in which analytic rotations were accomplished on an IBM 650 computer using Kaiser's normal varimax criterion. Five fairly strong and recurrent factors emerged from each analysis, labeled as (1) Surgency, (2) Agreeableness, (3) Dependability, (4) Emotional Stability, and (5) Culture. (Author)

AD-267 779 Div. 28
(TISTB/MS) OTS price $4.60

Michigan U., Ann Arbor.
DEVELOPMENT OF SELF-REPORT TESTS TO MEASURE PERSONALITY FACTORS IDENTIFIED FROM PEER

NOMINATIONS,
by Warren T. Norman. May 61, 41p. incl. illus. tables.
(Contract AF 41(657)269, Proj. 7717)
(ASD TN 61-44) Unclassified report

DESCRIPTORS: (*Personality, *Personality tests, Officer personnel, Military training, Effectiveness.) (*Personality, Measurement.) (*Personality tests, Statistical analysis.)

An experimental battery of personality tests was constructed as part of a project to develop personality tests appropriate for use in selection of applicants for Air Force officer training. Criteria were peer-nomination ratings previously shown to define personality factors that were predictive of Officer Effectiveness Ratings. Rational selection of testing techniques and item forms was supplemented by information from a series of tryouts with small samples. The battery will be administered to a large sample composed of groups from which reliable peer-rating criteria can be obtained for full cross validation. (Author)

AD-267 798 Div. 28
(TISTB/MS) OTS price $6.60

ITT Federal Labs., Palo Alto, Calif.
LEARNING IN PATTERN RECOGNITION,
by N. Abramson. Oct 61, 63p. incl. illus.
(Technical note no. 1)
(Contract AF 30(602)2278, Proj. 4505)
(RADC TN 61-216) Unclassified report

DESCRIPTORS: (*Learning, Target recognition, Mathematical analysis.)

This technical note deals with the study of optimum learning in pattern recognition problems. The class of pattern recognition problems which is treated is perfectly general and the results may be applied to patterns of visual, aural or electromagnetic origin. Mathematical solutions are derived and practical instrumentation of these solutions are suggested for the following pattern recognition situations: (1) recognition of fixed a priori known patterns immersed in additive gaussian noise, (2) recognition of unknown fixed patterns immersed in additive gaussian noise, (3) recognition of patterns drawn from a gaussian ensemble with known mean and covariance and immersed in additive gaussian noise, (4) learning in pattern recognition, (5) learning without a teacher, and (6) recognition of unknown patterns which vary in time (pattern tracking). (Author)

AD-267 802 Div. 28
(TISTB/MS) OTS price $1.10

Indiana U., Bloomington.
THE EFFECTS OF VERBAL REINFORCEMENT RATIOS ON SKIN CONDUCTANCE LEVELS,
by R. N. Berry. June 61, 5p. illus. table.
(Technical rept. no. 5)
(Contract Nonr-90815)
Unclassified report

DESCRIPTORS: (*Verbal behavior, *Memory, Learning, Stimulation, Physiology, Conditioned reflex.)

AD-267 832 Div. 28
(TISTB/CCH) OTS price $6.60

Utah U., Salt Lake City.
EXPLORATIONS IN THE MEASUREMENT AND PREDICTION OF CONTRIBUTIONS OF ONE SAMPLE OF SCIENTISTS,
by Calvin W. Taylor, William R. Smith and others. Apr 61, 62p. incl. illus.
(Contract AF 41(657)158, Proj. 7717)
(ASD TR 61-96) Unclassified report

DESCRIPTORS: (Exploration in Measurement and Production and Mathematical prediction of *Inventions in *Scientific research, Air force research of *Scientific personnel, Effectiveness.) Tests, Physics.

Physical scientists at two Air Force research centers were intensively interviewed concerning the nature of scientific productivity and the characteristics of effective scientists. Based on these interview suggestions, data were collected on 52 criteria. These were reduced analytically to 14 factor scores. Following this, several tests and questionnaires were developed for tryout as predictors. Scores from these and previously developed instruments were correlated with the factor scores and three original criteria. In the sample of 107 scientists, criteria most related to tests and questionnaires (in terms of number of significant correlations) were ratings of likableness as a member of a research team, membership in professional societies, organizational status, rated work output, supervisory ratings on over-all performance, and peer rankings on over-all productivity. The instruments that had scores correlating with the greatest number of criteria were a biographical data questionnaire, self-ratings, and a questionnaire designed to measure minimum level of aspiration. The outcomes of this investigation were identification of a wide variety of measurable criteria and a number of self-report instruments suitable for future longitudinal follow-up and validation as a means of identifying kinds of scientific talent needed by the Air Force. (Author)

AD-267 847 Div. 28
(TISTB/CW) OTS price $1.60

Research Center for Group Dynamics, U. of Michigan, Ann Arbor.
STUDIES ON DRIVE AND INCENTIVE IN PERCEPTION IV: SOME EFFECTS OF SOUND AND BACKGROUND BRIGHTNESS ON THE PERCEIVED SIZE OF COINS AND DISCS,
by Donald D. Dorfman and Robert B. Zajonc.
Nov 61, 14p. incl. illus. tables, 17 refs.
(Technical rept. no. 12)
(Contract AF 49(638)367)
Unclassified report

DESCRIPTORS: (*Reasoning, *Sensory perception, Brightness and Sound, *Needs, *Perception.)

The research was designed to test implications of the hypothesis that the Bruner-Goodman phenomenon is an instance of sensory interaction. Rich and poor children estimated the size of coins and discs under sound vs. no sound and two levels of background brightness. Contrary to prediction, no relation was found to exist between sound level and size estimation, although such a relation did exist for background brightness. The findings failed to replicate the data of Bruner and Goodman, whereas they were in substantial agreement with those of Carter and

Schooler. These results were as follows: (1) Large coins tended to be judged larger, and small coins judged smaller than neutral discs of comparable size; and (2) No differential affect was observed on the estimations of coins and discs as a function of economic status. There was, however, a reliable tendency for the children of lower economic status to overestimate both coins and discs when compared with those of higher status. (Author)

AD-267 848 Div. 28
(TISTB/CW) OTS price $2.60

Research Center for Group Dynamics, U. of Michigan, Ann Arbor.
STUDIES ON DRIVE AND INCENTIVE IN PERCEPTION V: RESPONSE SUPPRESSION IN PERCEPTUAL DEFENSE,
by Robert Zajonc. Oct 61, 24p. incl. illus. tables, 21 refs. (Technical rept. no. 14)
(Contract AF 49(638)367)
Unclassified report

DESCRIPTORS: (*Perception, *Behavior, Galvanic skin response, *Reaction (Psychology), Emotions, Stimulation, Inhibition, *Needs.)

To examine the relative effects of the stimulus and the response in perceptual defense experiments, recognition thresholds and autonomic reactions were first obtained to six neutral and six taboo words. Subsequently, Ss learned a list of paired-associates to a criterion of three perfect trials, where the original words served as stimulus terms and a new set of six neutral and six taboo words served as response terms. Half of the neutral stimuli were paired with neutral, and half with taboo responses. The same was true of the six taboo stimuli. Following, the paired-associates training recognition thresholds and GSR were again measured. One group of subjects, however, was required to give evidence of recognition by means of the response terms acquired in the paired-associates training, and another by means of the original stimulus presented. The results show that stimuli have no effect on either recognition threshold or GSR unless they produce response conflict. Irrespective of the emotionality of the stimulus, recognition threshold and GSR were found to be elevated when subjects were required to give a taboo response. Also, no differences between taboo and neutral stimuli were found when the responses required of the subjects were neutral. The strongest response effects were observed for rapid learners. (Author)

AD-267 904 Div. 28
(TISTB/MS) OTS price $1.10

Cornell U., Ithaca, N. Y.
(No title).
Final rept.,
by Edgar F. Borgatta. 1961, 5p.
(AFOSR grant no. 61-30)
Unclassified report

DESCRIPTORS: (*Behavior, Measurement.) Personality tests, *Factor analysis.

AD-268 009 Div. 28, 16, 30
(TISTB/CW) OTS price $3.60

Chicago U., Ill.
IN SEARCH OF THE FUNDAMENTAL UNITS OF PERCEPTION: AN OUTLINE,
by Peter H. Greene. 1 June 61, 22p.
(Contract AF 49(638)414, Proj. 9777c)
(AFOSR TN 60-622) Unclassified report

DESCRIPTORS: (*Perception, Nervous system, *Information theory, *Computers, Computer logic.)

Many properties of neurons and neural networks may be described mathematically. The relation of these properties to perception may be understood, however, only if one has some idea of the nature of the fundamental units of perception. Much study has been devoted to the problem of how the brain transforms incoming signals into useful form. An area of study which is comparatively undeveloped is investigation of the active role of the nervous system in the forging of significant perceptual units, and the fitting of these units to experience. The present outline is designed as an elementary introduction to ideas in this area. It is intended as an elaboration of the author's paper An Approach to Computers that Perceive, Learn, and Reason, (Proc. Western Joint Computer Conf., 1959, reprinted in General Systems Yearbook, Vol. V, 1960), and as an introduction to mathematical results cited herein. (Author)

29. QUARTERMASTER EQUIPMENT AND SUPPLIES

AD-267 150 Div. 29, 1
(TISTA/SEB) OTS price $.75

International Latex Corp., Dover, Del.
URINE COLLECTION AND DISPOSAL DEVICE FOR PRESSURE SUIT.
Final rept. on Physiology of Flight,
by Robert J. Redden. Aug 61, 18p. incl. illus. tables.
(Contract AF 33(616)7344, Proj. 7164)
(ASD TR 61-329) Unclassified report

DESCRIPTORS: (*Pressure suits, Plumbing fixtures, Design for *Urine, Disposal, Biochemical tests.) (Space flight, Weightlessness, Aviation personnel, Pilots, Physiology, Urine, Disposal.)

The design, fabrication, and testing of a urine collection and disposal system, to provide a means to remove urine from within a full pressure suit during long periods of use, in a weightless environment, and to provide a means of sampling each individual specimen of urine, are discussed. The prototype system consists of three basic parts: (1) a urinal to collect the urine within the suit, (2) a valve to allow removal of the urine from the suit, and (3) a collecting bag with valving to provide for disposal of the urine. The testing program provides a means of checking conformance to the design objectives as far as possible in the presence of gravity. Tests were performed both with and against gravity. Some of the components, designed for optimum performance in a weightless condition, could be adequately tested only under that condition. Weightless tests were not conducted. (Author)

AD-267 374 Div. 29, 20
(TISTB/LH) OTS price $5.60

Nuclear Science and Engineering Corp., Pittsburgh, Pa.
ACTIVATION ANALYSIS OF FOODS FOR CHARACTERIZATION

OF THE INDUCED RADIOACTIVITIES.
Rept. no. 3, (Final), 10 May 60-9 Feb 61,
by R. C. Koch. 9 Feb 61, 55p. incl. illus.
tables.
(Contract DA 19-129-qm-1601, Proj. 7-84-01-002)
Unclassified report

DESCRIPTORS: (*Food, Radiation effects, Decontamination, Tracer studies, Radiochemistry, Quantitative analysis, Experimental data, *Radioactivation analysis.)

A program was initiated to determine by neutron activation analysis the elemental concentrations of a variety of elements in beef, pork, ham, and chicken. The resulting data, combined with concurrent determinations of radioactivity balances for each food, will provide a basis for radiochemical characterization of the neutron-induced activities found or expected to be found in foods after sterilization at the several types of irradiation facilities. Ash residues from homogenized samples of the four foods were analyzed in two irradiation experiments. Data are reported for qualitative analyses of eight elements in each food and quantitative analytical data are reported for twenty additional elements. Of the elements determined, phosphorus, with concentrations in the bulk foods of about 0.1%, was the most abundant. Values of other trace element concentrations were as small as 1/100,000 ppm. (Author)

AD-267 405 Div. 29
(TISTB/LH) OTS price $1.60

Quartermaster Research and Engineering Command, Natick, Mass.
EFFECTIVE AREA OF CLOTHED MAN FOR SOLAR RADIATION,
by John R. Breckenridge. July 61, 15p. incl. illus. table (Technical rept. no. EP-157)
Unclassified report

DESCRIPTORS: (*Clothing, Sun, Radiation effects, Reflection, Body surface, Posture, Photographic analysis.)

The effective, or normal cross-sectional, area in the path of direct sunlight was determined for average-sized men dressed in each of 3 uniforms (standard Arctic, wet-cold, and hot-weather uniforms), and in each of 4 positions (sitting, standing, walking, and prone). Values were obtained by measuring the outlined areas of the men on photographs taken from various directions (front, rear, side, overhead). Front, side, and rear views were taken at camera angles with the horizontal of 15, 30, 45, 60, and 75 degrees, and overhead views were taken (camera angle, 90 degrees). The effective area varied regularly with solar angle. The respective curves for the three uniforms were approximately parallel, and some of the values were predicted by interpolation. For a given uniform and position, large changes in solar angle or direction of sunlight (as represented by shift in position of camera) often caused only minor changes in effective area. Mean values were least for a sitting position (0.40 and 0.46 sq m, respectively, for hot-weather and Arctic uniforms) and greatest for a walking position (0.62 and 0.79 sq m, respectively for the hot-weather and Arctic uniforms) (Author)

30. RESEARCH AND RESEARCH EQUIPMENT

AD-267 114 Div. 30, 14
(TISTM/EJH) OTS price $11.50

Martin Co., Baltimore, Md.
EVALUATION OF ULTRASONIC TEST DEVICES FOR INSPECTION OF ADHESIVE BONDS.
Quarterly progress rept. no. 8, 1 Apr-30 June 61, by John P. Reese, Von H. Boruff, and D. Lochary. July 61, 156p. incl. illus. tables, 18 refs.
(Rept. no. ER 10911-8)
(Contract NOa(s) 59-6266-c)
Unclassified report

DESCRIPTORS: (*Airplane panels, Airframes, Stainless steel, Aluminum alloys, Titanium, Honeycomb cores, Sandwich panels, Sandwich construction, Laminates, Reinforcing materials, Glass textiles, Bonding, *Bonded joints, Adhesion.) (*Resin adhesives, *Adhesives, Elastomers, Nitrile rubber.) (Test methods, *Non-destructive testing, *Ultrasonics, Test equipment.)

Data indicate that all instruments are capable to some degree of detecting the presence of corrosion in a bonded joint. A preliminary analysis of data obtained from full scale production honeycomb assemblies indicates the panels can be classified generally as acceptable or unacceptable, but a direct correlation to specific bond strength does not exist. Finally, nondestructive tests on honeycomb panels constructed with faces of reinforced plastic, Ti and stainless steel revealed the presence of large voids but not that of other bond variables. Initial data from the AGARD program gave indications of the following the same general pattern, that is, bond variations of porosity, voids, and glue line thickness can be detected while variations due to poor adhesion and undercured adhesive give indications similar to those of a standard bond. (Author)

AD-267 127 Div. 30, 14
(TISTM/EJH) OTS price $1.60

ITT Federal Labs., Nutley, N. J.
RESEARCH AND DEVELOPMENT FOR GROWTH OF SINGLE CRYSTALS BY THERMAL FUSION UTILIZING RF HEATING.
Final technical rept. 31 May 60-15 Apr 61, by A. J. Marino, Jr. May 61, 9p. illus.
(Contract AF 19(604)7219)
(AFCRL-593) Unclassified report

DESCRIPTORS: (Crystals, *Single crystals, Melting, *Induction heating, Growth, *Manufacturing methods, Production, Preparation.) (Laboratory equipment, Design, Operation.) (Semiconductors, Germanium, Silicon, Ferrites, Garnet, Production.)

Two multipurpose crystal growers, incorporating 4 of the basic melt techniques, were developed. Results obtained from previous work was the basis of evaluation for developing and constructing these units. Each unit is physically the same, but variations of freency are the prime difference. The design lends itself to the production of crystals up to 6 in. in length. Rates of growth, atmospheres, r-f generator controls, etc., are all mounted on a console for ease of operation. (Author)

AD-267 144 Div. 30, 25, 14
(TISTM/EJH) OTS price $1.75

Bell and Howell Research Center, Pasadena, Calif.
A MASS SPECTROMETER SYSTEM FOR MATERIALS RESEARCH. PHASE III.
Rept. for 1 Jan 60-28 Feb 61 on Materials Analysis and Evaluation Techniques,
by Charles F. Robinson, Norton W. Bell and others. Aug 61, 54p. incl. illus.
(Contract AF 33(616)5571, Proj. 7360)
(WADC TR 59-107, pt. 3) Unclassified report

DESCRIPTORS: (*Mass spectrometers, *Spectrophotometers, Design, Operation, Sensitivity, Ion sources, Electron beams, Electron bombardment, Electron multipliers, Power supplies, Oscillographs.) (*Mass spectroscopy, Gases, Liquids, Solids.)

There are 3 areas in which mass spectrometry may be expected to contribute to science and technology: (1) identification and estimation of minor components and trace impurities in solids; (2) structural studies of high-molecular weight materials; (3) identification and estimation of unknown materials by precise measurement of molecular weight. A program of research and development was undertaken to produce a single high-performance mass-resolving system which, together with a limited number of ion source and ion detector modules, would be adaptable to any of the 3 problem areas. A basic system with a resolution of about one part in 2500 was produced. Ion sources using spark, electron bombardment and high temperature crucible were adapted to the basic system and photographic plate, electrometer and electron multiplier detectors were used. (Author)

AD-267 172 Div. 30, 20
(TISTW/PD) OTS price $4.60

Stanford Research Inst., Menlo Park, Calif.
DESIGN AND CALIBRATION OF A TOTAL-PRESSURE PROBE FOR DUST-LADEN AIR.
Final rept.,
by A. R. Kriebel. July 59, 36p. incl. illus. tables.
(Contract Nonr-158605)
(DASA-1158) Unclassified report

DESCRIPTORS: (Air, Particles, Pressure of Gases, Measurement.) (Nuclear explosions, Air blast, Air, Contamination.) *Pressure gages, Design, Calibration, Air blast, Measurement, Errors.

A total-pressure probe was designed and tested for use in high-velocity airstreams which are heavily laden with dust, specifically in airblasts from field tests of nuclear weapons at low heights of burst over a desert surface. Analysis predicts that the probe should measure nearly independently and with high-frequency response the total pressure of the gas phase and the momentum flux of suspended particulate, provided that the particles range in size from about 2 to 20 microns. Experimental results are in agreement with the prediction that the probe should respond to about one-half the momentum flux of particles in this size range. The response of the probe to dust decreases rather rapidly as the particle size departs from this range and also as the angle of attack of the probe becomes large. (Author)

AD-267 274 Div. 30, 8
(TISTP/JDP) OTS price $4.60

Electronic Defense Labs., Mountain View, Calif.
A QUARTER SQUARE MULTIPLIER FOR ANALOG SIMULATION,
by Eugene Henry and Thomas Gunn. 1 Aug 61, 36p. incl. illus. tables (Technical memo. no. EDL-M382)
(Contract DA 36-039-sc-87475)
Unclassified report

DESCRIPTORS: (*Analog computers, Simulation, Electronic equipment, Synthesis.) (*Electron multipliers, Synthesis, Analog computers.) (*Frequency multipliers, Synthesis, Analog computers.)

The GEDA computer contains electronic multipliers which allow the multiplication of variable voltages up to a frequency limit of about 100 cycles per second. To raise this limit, a solid-state quarter square multiplier using Zener breakdown is considered. (Author)

AD-267 280 Div. 30, 31
(TISTW/EET) OTS price $1.60

Naval Research Lab., Washington, D. C.
A COMPARISON OF QUICKENED AND UNQUICKENED DISPLAYS FOR THE MONITORING OF VEHICLE PERFORMANCE UNDER FULL AUTOMATIC CONTROL.
Interim rept.,
by Gordon H. Runner and James S. Sweeney.
24 Oct 61, 12p. incl. illus. (NRL Rept. no. 5696)
(Proj. SF 0130901-4976)
Unclassified report

DESCRIPTORS: (*Submarines, *Control systems, *Display systems, Monitors, Analog computers, Reliability, Effectiveness.) (Submarines, Control systems, Simulation, *Submarine simulators, Reliability.) (Control systems, Errors, Detection.) Human engineering.

The relative effect on system failure detection of two methods of processing and displaying submarine automatic-dive-control information was investigated. The submarine dynamics were simulated on analog computers. The display systems studied were (1) conventional - dive plane angle, boat pitch angle, and the depth of the submarine displayed on separate indicators, and (2) quickened - depth and other derivatives summed to a single indication of command depth through appropriate feedback circuitry. The subjects' task was to report a malfunction in the simulated dive-control system. To examine the relative ease of detection of a failure by means of the two display systems, the times required to recognize and report a malfunction were compared for the two display systems. It was found that the time required to detect and report a failure was considerably greater with the conventional display system. (Author)

AD-267 295 Div. 30, 4, 25
(TISTW/RD) OTS price $6.60

Institute for Cooperative Research, U. of Pennsylvania, Philadelphia.
THE LABORATORY FOR RESEARCH ON THE STRUCTURE OF MATTER.
Annual rept. no. 1, 1 July 60-30 June 61,
by John N. Hobstetter. 30 June 61, 61p.
Unclassified report

DESCRIPTORS: (*Laboratories, *Scientific research.) (Materials, Scientific research, Cryogenics, Semiconductors.) (Scientific research, Physics, Chemistry.) (Crystal structure, Solid state physics, X-ray diffraction analysis, Research program administration.

AD-267 320 Div. 30, 8
(TISTE/CCD) OTS price $3.60

Hallicrafters Co., Chicago, Ill.
HANDBOOK OF INSTRUCTIONS FOR FILTER UNIT SET, FLUID PRESSURE QRC-133A(T).
28 July 61, 40p. incl. illus. tables.
(Contract AF 33(604)21206)
Unclassified report

DESCRIPTORS: (*Instruction manuals, *Handbooks, *Oil filters, Maintenance equipment, *Test sets, Fluid flow, Pressure.) (Radio transmitters, Backward-wave oscillators, Coolants, Dielectrics, Test equipment.)

Instructions are presented for the operation and maintenance of filter unit set, fluid pressure QRC-133A(T). The subject unit is intended as part of the maintenance and test equipment for the QRC-133A(T) liquid cooler and transmitter. The test set performs the following functions: (1) Filters small particles 6 to 8 microns in size, as well as forms of oxidation which may be present in DC-200-20 CTSK silicone oil (or equivalent fluid) used as the coolant dielectric for the carcinotron and high voltage section of the QRC-133A(T) transmitter; (2) Drains contaminated oil and/or fills the liquid cooler and transmitter with filtered oil; and (3) Checks the pump and flow switch operation of the liquid cooler, and indicates the parameters necessary for adjusting and setting the flow switch. (Author)

AD-267 375 Div. 30, 6, 18
(TISTW/EET) OTS price $3.60

Naval Research Lab., Washington, D. C.
THE NAVAL DATA HANDLING SYSTEM CAPABILITIES IN POSITION AND RATE-AIDED TARGET TRACKING,
by S. C. Wardrip. 6 Oct 61, 28p. incl. illus. tables (NRL rept. no. 5672)
Unclassified report

DESCRIPTORS: (*Antiaircraft defense systems, Ships, Targets, *Radar tracking, *Data processing systems, Data storage systems, Radar equipment, Display systems, Effectiveness.) (Fleets, Antiaircraft defense systems.) Search radar, Plan-position indicators, Computers, Analog systems, Target position indicators.)

The Naval data handling system is a semiautomatic target tracking system capable of handling up to 24 targets. The target data are position, velocity, height, size, identity, and identifying track number. The system is capable of an increased rate of updating target information over manual methods, and makes these data available to appropriate operators and observers. The system was designed to be used in conjunction with radars and weapons systems for fleet air defense. Data were taken to determine the accuracy of position extraction and velocity derivation in conjunction with manual rate-aiding using both operator inputs and standard voltage inputs. The data show that the accuracy of the target data extracted and presented depends largely on the operator's tracking ability. An operator can extract target position data to within 1 percent of the PPI range setting. The maximum velocity error was approximately + or - 100 knots for a 600-knot target on a PPI range setting of 100 miles. (Author)

AD-267 565 Div. 30, 32
(TISTB/CCH) OTS price $4.60

Autonetics, Downey, Calif.
REDUNDANCY, RELIABILITY, AND ERROR CORRECTING CODES. AN ANNOTATED BIBLIOGRAPHY,
by Marnelle Kinney. 22 Aug 61, 44p. (Rept. no. EM-7106)
Unclassified report

DESCRIPTORS: (*Bibliography, *Coding, Errors, Reliability.) Digital computers.

This bibliography on redundancy, reliability, and error-correcting codes represents a survey of the literature covering the period 1947-1961. There are 108 references arranged alphabetically by title in three classifications: error-correcting codes, redundancy, and miscellaneous papers. An author index and a combined periodical and source index follow the references. (Author)

AD-267 758 Div. 30, 9
(TISTA/WAW) OTS price $3.60

Space Technology Labs., Inc., Los Angeles, Calif.
DESIGN OF A SUCTION-TYPE, INTERMITTENT WIND TUNNEL FOR SUPERSONIC AND SUBSONIC TESTING,
by Rudolf X. Meyer, William B. Bush, and Urban A. von der Embse. 27 May 58, 30p. illus. (Rept. no. GM-TR-0127-00400)
(Contract AF 04(647)127)
Unclassified report

DESCRIPTORS: (*Wind tunnels, *Supersonic wind tunnels, Design, Subsonic flow, Supersonic flow, Mathematical analysis.) (Boundary layer control by Gas ionization, Magnetohydrodynamics, Test facilities.)

Theoretical experimental investigations previously indicated the feasibility of ionizing an aerodynamic boundary layer by means of a gaseous discharge. In the presence of magnetic fields, sufficiently large forces acting on the air in the boundary layer can be developed. The principles involved are those of magnetohydrodynamics, together with those of the electrical breakdown of gases. To study the application of these techniques of boundary layer control, a wind tunnel is required. A detailed description is presented of wind tunnel and component designs. (Author)

AD-267 760 Div. 30, 16, 29
(TISTB/JB) OTS price $2.60

Quartermaster Research and Engineering Command, Natick, Mass.
ENVIRONMENTAL PROTECTION RESEARCH BY MEANS OF RADIO TELEMETRY. II. MEASUREMENT OF PULSE RATE FROM ACTIVE TEST SUBJECTS,
by Francis W. Botsch, James J. Powers, and Michael J. Sacco. July 61, 19p. incl. illus.
(Technical rept. no. EP-158)
(Proj. 7X83-01-009)
Unclassified report

DESCRIPTORS: (*Exercise, Stress (Physiology), Heart, Blood circulation, Monitors, Measurement, *Radio, Transducers, Radio equipment, Telemetering, Recording devices, Instrumentation, *Cardiotachometers, Test sets.)

Three instruments: (1) a wire telemeter used in climatic chamber studies, (2) a portable unit which delivers an audio signal suitable for either earphone monitoring or recording on magnetic tape, and (3) a radiocardiotachometer used in field studies, are described for the measurement of pulse rates from active human test subjects. A noise-free, non-ambiguous record

of pulse beats during strenuous exercise is obtained from a simple photoelectric transducer which senses light intensity fluctuations on the surface of transluminated vascular areas without pre-exercise instrumentation or training of test subjects. Photographs, circuit diagrams, and drawings of the component parts of the instruments are given. Sample data are presented which show the pulse wave shape and typical transient response curves of pulse rate for various activities. (Author)

AD-267 845 Div. 30
(TISTE/CRJ) OTS price $9.60

Kauke and Co., Inc., Santa Monica, Calif.
STUDY OF AUTOMATED LABORATORY CALIBRATION.
Final rept., 3 Jan-15 Nov 61.
20 Nov 61, 111p. incl. illus. tables (Rept. no. GL 11424)
(Contract AF 04(611)6349)
Unclassified report

DESCRIPTORS: (*Aeronautical laboratories, Automation, Calibration, Test equipment, *Test facilities, Flight testing, Instrumentation.)

Efforts were made to determine the technical and economic feasibility of achieving automation in any of the processes by which flight test instrumentation is presently being calibrated in the Laboratory at Edwards Air Force Base. Calibration of flight test instruments and instrumentation systems in support of specialized flight test projects is the primary function of the laboratory facility. The capability to perform this primary function by means of the manual calibration system which presently exists inherently includes the capability to perform numerous other critical but secondary functions, such as repair, modification, environmental tests, etc, on non-standard and standard equipment. Automation of the calibration functions, and upgrading of performance specifications are the objectives of the recommendations presented. (Author)

AD-267 857 Div. 30, 8
(TISTE/CRJ) OTS price $1.60

Antenna Lab., Ohio State U. Research Foundation, Columbus.
THE OHIO STATE UNIVERSITY OPTICAL FREQUENCY SPACE PROPAGATION SIMULATOR.
Rept. on Study of Electromagnetic Radiation,
by R. K. Long. 15 Oct 61, 5p. illus. (Rept. no. 1083-11)
(Contract AF 33(616)7081)
Unclassified report

DESCRIPTORS: (*Electromagnetic waves, *Light, *Infrared radiation, Attenuation, Absorption, Propagation, Spectrographic analysis.) (Masers, Light, Amplifiers, Ruby, Optical equipment.) (*Optics laboratories, Electronics laboratories, *Laboratory equipment, Test facilities, Simulation, *Optical systems, Infrared optical systems.) Communication systems.

The development of optical masers has raised the possibility of their use in communication and high power transmission systems. At The Ohio State University, a facility was constructed to make measurements of the propagation effects associated with such systems. (Author)

AD-267 858 Div. 30, 25
(TISTM/TCG) OTS price $4.60

Stanford U., Calif.
DAMPING DUE TO CREEP IN A VIBRATING HELICAL SPRING,
by Rudolf Charles Meiner. Aug 61, 15p. incl. illus. (Rept. no. SUDAER 113)
(Contract AF 49(638)223)
(AFOSR-1421) Unclassified report

DESCRIPTORS: (*Laboratory equipment, Test methods, Determination of *Damping, Creep, Vibration, *Helical springs, Aluminum alloys, Temperature, Distribution, Calibration, Microphotography.)

The development of suitable and reliable equipment for measurements of static and vibratory properties of helical aluminum springs at high temperatures is described. The results of a test series of preliminary character and of a test series under improved conditions are given in graphic representations. The orders of magnitude involved for series I and II are (approximate values): temperature, 350 and 560 F; and damping per cycle, 13 and 5%, respectively, at spring constants of 2 lb/in., loads up to 1.4 lb, creep rates of 0.001 to 0.1 in./sec, and frequencies of vibrations of 4 c. (Author)

AD-267 867 Div. 30, 32
(TISTP/LH) OTS price $15.50

Wayne State U., Detroit, Mich.
RESEARCH IN MACHINE TRANSLATION RUSSIAN--ENGLISH.
Annual rept. no. 3,
by H. H. Josselson. 31 Aug 61, 227p. incl. illus.
(Contract Nonr-256200)
Unclassified report

DESCRIPTORS: (*Machine translation, Coding, Language, Dictionaries, Programming.)

AD-267 886 Div. 30
(TISTP/JW) OTS price $3.60

Raritan Arsenal, Metuchen, N. J.
CONCEPT FOR HIGHLY MECHANIZED DATA PROCESSING, PROJECT 111.
15 Nov 61, 28p. illus.
Unclassified report

DESCRIPTORS: (*Data processing systems, *Computers.) (Reliability, Maintenance, Management engineering, Logistics, Analysis.)

A concept is developed for a highly mechanized maintenance data processing system capable of deriving factors, influences, and correlations to raise the level of logistics knowledge and lead to the design of a management-control system. (Author)

AD-267 901 Div. 30, 32
(TISTB/LH) OTS price $2.60

System Development Corp., Santa Monica, Calif.
THE CONSTRUCTION OF AN EMPIRICALLY BASED MATHEMATICALLY DERIVED CLASSIFICATION SYSTEM,
by Harold Borko. 26 Oct 61, 23p. incl. illus. tables. (Rept. no. SP-585)
Unclassified report

DESCRIPTORS: (*Data processing systems, *Documentation, *Classification, Coding, Indexes, Factor analysis, Correlation techniques.)

A method for developing an empirically based, computer derived classification system is described. The library of documents chosen for experimentation consisted of 618 psychological abstracts which were coded for computer processing. The total text consisted of approximately 50,000 words; nearly 6,800 were unique. Words were arranged in order of frequency of occurrence. From the list of words which occurred 20 or more times, excluding syntactical terms such as, and, but, of, etc., the investigator selected 90 for use as index terms. These were arranged in a data matrix with the terms on the horizontal and the document number on the vertical axis. The cells contained the number of times the term was used in the document. A correlation matrix, 90x90 in size, was computed which showed the relationship of each term to every other term. The matrix was factor analyzed and 53 eigenvectors obtained. Three groups of these vectors--the first four, the first 10, and the first 18--were selected as factors and were rotated for meaning. All factors were interpreted and the set of ten proved to be the most meaningful as classification categories. These factors were compared with, and shown to be compatible but not indentical to, the classification system used by the American Psychological Association. The results demonstrate the feasibility of an empirically derived classification system and establish the value of factor analysis as a technique in language data processing. (Author)

AD-267 935 Div. 30, 12
(TISTA/SEB) OTS price $7.60

Ball Brothers Research Corp., Boulder, Colo.
DESIGN STUDY FOR AN IMPROVED OPERATIONAL RADIOMETER.
Final rept.,
by D. S. Johnson, D. L. Fain and R. L. Hershey.
Mar 61, 55p. incl. illus. (Rept. no. SR61-3)
(Contract AF 19(604)6121)
(AFCRL-459) Unclassified report

DESCRIPTORS: (Satellite vehicles, *Radiometers, Design.) (Measurement of Solar energy, Infrared radiation, Reflection from Earth.)

A radiometer design capable of measuring solar radiation reflected from the earth (0.18 to 4.0 micron range) and infrared radiation from the earth (3.5 to 40 micron range) from a space satellite is discussed. A model of the radiometer was built that is virtually flyable. The radiometer was improved by: reducing error in the optics system by moving the filter between the vibrating-reed chopper and the detector; improving the constancy of the detector cavity temperature over a wide environmental range; significantly improving the stability and reliability of the entire electronics stack and the scanning assembly and; simplifying the mechanical assembly and disassembly of the unit. A fundamentally superior instrument would be realized by: using a reflective re-imaging optical system; using a low impedance detector; eliminating detector cavity temperature control; exploring sub-cooling of the detector and; expanding the output scale over the target range of 200 to 300 K. (Author)

AD-268 028 Div. 30, 8
(TISTE/CDM) OTS price $3.60

Aerojet-General Corp., Azusa, Calif.
BUILDING BLOCK STUDY.
Quarterly rept. no. 3, 16 Apr-15 July 61,
by W. S. Simpson. 15 July 61, 15p. illus. tables (Rept. no. 0447-01-3)
(Contract DA 36-039-sc-85159, Proj. 3G89-01-001-01) Unclassified report

DESCRIPTORS: (*Military equipment, *Electronic equipment, Maintenance, *Test sets, Design.) (Test equipment, *Maintenance equipment, Automatic, Programming.) (Military equipment, Electronic equipment, *Data processing systems.)

Effort was concentrated on preparing a tubulation of data defining the technical requirements for the field maintenance testing of standard tactical signal equipment in current field-army use. On the basis of experience gained earlier, it was recognized that the task would require the development of a systematic technique for extracting data rapidly from many maintenance manuals in a form suitable for correlation and analysis, and that EAM (electric-accounting-machine) techniques should be utilized. The development of procedures and techniques, particularly the techniques for tabulating the data on test requirements, have proved to be more complex than expected. Although general concepts were developed early, extensive debugging of the system was required so that consistent data could be obtained; thus, progress in actual tabulation was slow. However, the procedure was completely defined; and full-scale tabulation work was started. (Author)

AD-268 045 Div. 30, 8
(TISTP/MFA) OTS price $2.25

Burroughs Corp., Paoli, Pa.
MAGNETIC LOGICAL TRANSDUCERS.
Rept. for June 59-May 61,
by O. Stram, S. Einhorn and J. Celia. Aug 61, 92p. incl. illus. tables, 96 refs.
(Contract AF 33(616)6355, Proj. 7062)
(ASD TR 61-228) Unclassified report

DESCRIPTORS: (*Transducers, *Magnetic cores, Switching circuits, *Computers, Digital computers.) (Mathematical logic, Algebras, Combinatorial analysis, Transformations (Mathematics).) (Experimental data, Tables.) *Bibliography.

A method is presented for the logical design of single-stage, combinatorial switching circuits of n-variables. It is applicable to circuits composed of threshold devices, such as magnetic cores, transistors with Kirchoff adder inputs, parametrons, etc. A study of the constraints imposed by the form of the input portions of the threshold devices leads to the definition of certain classes of functions, physically realizable in a single device. With this method, arbitrary switching functions of as many as seven variables were easily designed by hand computations. An algorithm for mechanizing Boolean switching functions, by means of a net of magnetic toroidal cores, is described. The algorithm is referred to as Simplex which, in this application, is programmed for a digital computer. Computer-derived solutions specify the wiring configuration for a core or net of cores yielding a device for performing combinatorial logic. Switching functions are realizable in essentially one clock time. An updated bibliography is included. (Author)

AD-268 055 Div. 30
(TISTB/MS) OTS price $1.60

Foreign Tech. Div., Air Force Systems Command, Wright-Patterson Air Force Base, Ohio.
CYBERNETIC MACHINES.

by Yu. Bazilevskiy. 29 Nov 61, 13p. incl. illus. (Trans. no. FTD-TT-61-221 of Ekonomicheskaya Gazeta, No. 8:21-23, 25 Sep 61)
Unclassified report

DESCRIPTORS: (*Cybernetics, *Automation, *Computers, USSR.) (*Technological intelligence, *Translations.)

AD-268 086 Div. 30
(TISTP/CW) OTS price $10.50

Computation Center, Carnegie Inst. of Tech., Pittsburgh, Pa.
RESEARCH AND DEVELOPMENT IN PROGRAMMING STUDY ASSIGNMENTS.
Progress rept.,
by A. J. Perlis. 22 Feb 61, 132p. incl. illus.
(Contract DA 36-039-sc-75081)
Unclassified report

DESCRIPTORS: (*Digital computers, *Programming, Automatic, Coding, Storage, *Data processing systems.)

A single programming language is described, though it has from the programmer's point of view three forms. The forms are: (1) an algebraic language, viz ALGOL; (2) a symbolic machine-like coding language, like TASS; (3) a symbolic list processing language, like Threaded Lists. The three are described as one language, 20 L, using the same syntax description, in Part I. There is only one processor, 20 P, described in Part II. The design of the processor is described in terms of actions taken at various phases of the translation process. (Author)

31. SHIPS AND MARINE EQUIPMENT

AD-267 261 Div. 31
(TISTP/JW) OTS price $1.10

Coast Guard, Washington, D. C.
TEMPERATURE INSIDE AIDS TO NAVIGATION LANTERNS,
by P. O. Chapman. 5 Dec 61, 2p. (Field Testing and development unit rept. no. 270)
(Proj. CGTD J24-2/1-1-15)
Unclassified report

DESCRIPTORS: (*Lighting equipment, Temperature, Test methods.) (*Navigational lights, Lighthouses, Buoys.)

This analysis describes tests that determined the ambient temperatures inside various standard marine lanterns used on Coast Guard lighted buoys and minor shore lights. The effects of lantern colors, direct or indirect sunshine, and water or shore environment are reported. Temperatures up to 120 F. were reported inside the top of black lanterns. (Author)

AD-267 390 Div. 31
(TISTE/NTM) OTS price $6.60

Naval Civil Engineering Lab., Port Hueneme, Calif.
DEVELOPMENT OF 15,000-POUND STATO ANCHOR.
Report on Y-F015-10-003, Type C,
by R. C. Towne and J. V. Stalcup. 6 Nov 61, 64p. incl. illus. tables, 9 refs. (Technical rept. no. 158)
Unclassified report

DESCRIPTORS: (*Anchors, *Sea anchors, Design, Steel, Tests, Anchor chains, Test equipment, Test methods, Measurement.)

A 15,000-pound anchor was fabricated using the criteria developed for the STATO family of anchors. The successful evolution of this new member of the STATO anchors may permit additional economies to be realized in the design of permanent moorings. The development of the anchor is described, tests and results are discussed, proof-loading techniques are suggested, and a statistical approach to predicting holding powers based on limited testing is offered. The new STATO anchor has a holding capacity of 320,000 pounds in a sand bottom. (Author)

AD-267 620 Div. 31
(TISTE/CRJ) OTS price $2.60

Norwegian Ship-Model Experiment Tank, Trondheim.
PRACTICAL SHIP FORMS OF MINIMUM WAVE RESISTANCE,
by J. K. Lunde and H. AA. Walderhaug. 1960, 21p. incl. illus. tables (Rept. no. 2)
(Contract N62558-2235)
Unclassified report

DESCRIPTORS: (*Ship models, Water waves, Resistance, *Hydrodynamics, Model tests, Model basins, Tests, Pitch.)

Model tests in waves were conducted with 2 practical ship forms of minimum wave resistance in still water, and with 2 Taylor models corresponding to the minimum resistance forms. The tests were performed at 3 different wavelength/shiplength-ratios and with different speeds of the models. A film was taken of the models during the tests, and pitching, heaving and resistance were registered. The test results are given in diagrams and tables. (Author)

AD-267 628 Div. 31
(TISTB/LH) OTS price $10.50

Michigan U. Coll. of Engineering, Ann Arbor.
BIBLIOGRAPHY OF SELECTED LITERATURE OF LOW MAINTENANCE SHIP PROPULSION PLANTS.
Final rept.,
by George L. West, Jr., and I. Yilmaz Egrikavuk. Oct 61, 133p. (Rept. no. 04625-1-F)
(Contract Nonr-122443)
Unclassified report

DESCRIPTORS: (*Bibliography, *Ship turbines, Ships, Propulsion, Maintenance.) Boilers, Corrosion, Diesel engines, Electrical equipment, Fuels, Gas turbines, Gears, Heat exchangers, Lubrication, Pumps, Pipes, Steam turbines, Boiling water reactors.

AD-267 938 Div. 31
(TISTP/LH) OTS price $5.60

Autonetics, Downey, Calif.
AN ANNOTATED BIBLIOGRAPHY OF SELECTED REFERENCES ON HYDROFOIL CRAFT CONTROL AND DEEP WAVES ANALYSIS,
by Barbara Ann Bryce. 11 Sep 61, 59p. (Rept. no. EM-7276)
Unclassified report

DESCRIPTORS: *Bibliography, *Hydrofoil boats, Seaplanes, Hydrodynamics, Hydrofoils, Control systems, Ocean waves, Analysis.

32. MISCELLANEOUS ARTS AND SCIENCES

AD-267 167 Div. 32
(TISTB/MS) OTS price $10.50

RAND Corp., Santa Monica, Calif.
ECONOMICS DEPARTMENT PUBLICATIONS, 1948-1961; AN AUTHOR INDEX OF THE OPEN LITERATURE, WITH ABSTRACTS,
by Harriett Porch. Oct 61, 135p., 414 refs. (Research memo. no. RM-2800-PR)
(Contract AF 49(638)700, Proj. RAND.)
Unclassified report

DESCRIPTORS: (*Economics, *Bibliography, *Indexes.)

AD-267 177 Div. 32
(TISTB/CCH) OTS price $1.60

Aerospace Corp., El Segundo, Calif.
BIBLIOGRAPHY OF REPORTS.
Rept. for period ending 30 Sep 61.
10 Oct 61, 14p. incl. illus. (Rept. no. CSR-930(9990)BR-1)
(Contract AF 04(647)930)
Unclassified report

DESCRIPTORS: (*Bibliography of *Scientific reports, *Scientific research, Industrial research.) *Military research.

AD-267 189 Div. 32, 15
(TISTB/MS) OTS price $1.60

Michigan U. Coll. of Literature, Science, and the Arts, Ann Arbor.
SEQUENCE GENERATORS AND FORMAL LANGUAGES,
by Arthur W. Burks and Jesse B. Wright. Sep 61, 9p. incl. illus. (Rept. no. 03105-21-T)
(Contract Nonr-122421)
Unclassified report

DESCRIPTORS: (*Language, Sequences.) *Sequential analysis.

AD-267 548 Div. 32, 28
(TISTB/MS) OTS price $1.60

Washington U., St. Louis, Mo.
DETERMINANCY VERSUS RISK: A CRITIQUE OF CONTEMPORARY STATISTICAL METHODOLOGY IN SOCIOLOGY,
by L. Keith Miller. Oct 61, 15p. incl. illus. tables (Technical rept. no. 14)
(Contract Nonr-81611)
Unclassified report

DESCRIPTORS: (*Sociology, Sociometrics, *Statistical analysis, Test methods, *Statistical tests, Measurement, Real variables.) *Group dynamics.

AD-267 606 Div. 32, 15
(TISTB/CCH) OTS price $1.60

Documentation, Inc., Washington, D. C.
RESEARCH ON THE DEVELOPMENT OF A STORAGE AND SEARCH THEORY.
Technical rept.
Nov 61, 15p.
(Contract AF 49(638)91)
(AFOSR-1837) Unclassified report

DESCRIPTORS: (Design, *Data storage systems, *Data processing systems.) (Documentation, Theory.) *Information theory, Computers.

AD-267 679 Div. 32
(TISTB/LH) OTS price $1.60

Purdue U. School of Industrial Management, Lafayette, Ind.
A SUGGESTED EQUILIBRIUM MECHANISM FOR A FOREIGN EXCHANGE MARKET,
by Peter W. Frevert. 1961, 15p. (Institute paper no. 14)
Unclassified report

DESCRIPTORS: (*Economics, Economic conditions, *Commerce, Theory, Mathematical prediction, Reactions (Psychology).)

The major purpose of this paper is to identify the various components of demand for and supply of foreign exchange in a market which provides facilities for both traditional types of contracts: spot and forward. The basic technique employed is that of aggregation of individual demand curves derived from individual utility functions. Since the ultimate objective of the present paper is the construction of a linear model to explain the movement of gold and short term funds, specific assumptions are employed. The most important of these is the assumption that exchange rates are constrained by gold arbitrage to move only between the gold points, making the model one of a market having supported prices. The analysis is carried out in terms of two countries and one exchange rate. (Author)

AD-267 868 Div. 32
(TISTA/SEB) OTS price $1.60

Lockheed Aircraft Corp., Sunnyvale, Calif.
SPECIAL BIBLIOGRAPHIES 1959 - 1961. PART I. BIBLIOGRAPHIES RELEASED FOR PUBLIC DISTRIBUTION,
1961, 10p. (Rept. no. SB 60-42-1)
Unclassified report

DESCRIPTORS: *Bibliography, Scientific reports, Indexes.

33. TRANSPORTATION

AD-267 822 Div. 33
(TISTA/LSK) OTS price $11.00

Ohio River Div. Labs., Engineer Corps., Cincinnati.
HEAVY LOAD TEST TRACKS REPORT OF CONSTRUCTION,
by Kenneth H. McKee. Feb 61, 145p. incl. illus. tables. (Technical rept. no. 4-17)
(In cooperation with W. L. Harper Co., Cincinnati, Ohio, Contract DA 46-022-eng-2367)
Unclassified report

DESCRIPTORS: (*Runways, Pavements, Test facilities, Reinforcing steel, Construction, Materials, Civil engineering.)

The need for sound and economical design criteria for airfield pavements capable of supporting 325,000 lbs. on a twin-tandem aircraft

gear prompted the construction of these test tracks which embody all conditions that existed in 1957 and new designs considered practical. Test pavements included plain concrete on thin filter base course and on natural subgrade, plain concrete on lean-mix concrete base, partial-bond rigid overlay, high-bond rigid overlay, steel-reinforced rigid overlay and rigid overlay of rigid pavement previously strengthened with non-rigid materials. A description is presented of the construction procedures, and of testing undertaken both on subgrade and construction materials. Test data and results are discussed; conclusions and recommendations as to future construction of this type are given. (Author)

NON-MILITARY AND OLDER MILITARY RESEARCH REPORTS

Descriptors marked with an asterisk are included in the subject index.

BEHAVIORAL SCIENCES

PB 157 629 $7.60

Applied Psychological Services, Wayne, Pa.
POST-TRAINING PERFORMANCE CRITERION DEVELOPMENT AND APPLICATION: GENERALIZED GUTTMAN AND THURSTONE SCALES FOR ELECTRONIC JOB PERFORMANCE EVALUATION, by Arthur I. Siegel and Douglas G. Schultz. Rept. on Contract Nonr-2279(00). Oct 60, 71p. 14 refs. AD-245 989.

DESCRIPTORS: Maintenance personnel, *Military training, Effectiveness, *Psychometrics, Attitudes, *Achievement tests, Statistical analysis, Naval personnel, Electronic equipment, *Maintenance, Job analysis

Skills involved in the Naval ratings of aviation electrician's mate, aviation electronics technician, aviation fire control technician, and TRADEVMAN are scalable by both the Thurstone method of equal-appearing intervals and the Guttman method of scalogram analysis. It is possible to construct a single scaled technical proficiency check list which can be applied to technicians in any of four electronics ratings. As measured by the Scaled Technical Proficiency Check List, TRADEVMEN are significantly less proficient on the electronics tasks common to all four ratings than aviation electrician's mates, aviation electronics technicians, and aviation fire control technicians. As reflected by the scaled lists, the proficiency of electronically oriented technicians on the tasks done in these ratings rises from striker to petty officer second class. The Naval attitudes of electronics technicians, as expressed in a self-report questionnaire, generally are not strongly related to technical fleet proficiency, although attitudes regarding certain aspects of the job may have slight, positive relationships with proficiency. The fleet effectiveness of electronics technicians, as reflected by the scaled lists, is not related to scores on the Navy Basic Test Battery or to technical school grades. (Author) (See also PB 149 900)

Human Engineering

AD-259 071 $6.60

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
EVALUATION OF HUMAN SUBJECT REACTION IN THE FORWARD AND AFT FACING SEATED POSITIONS, by H. Noble and L. P. Domzalski. Rept. on Proj. TED NAM AE-6303.1. 9 Feb 61, 64p. Rept. no. NAMC-ACEL-424.

DESCRIPTORS: Seats, *Aircraft seats, *Aviation accidents, Acceleration, Reaction time, Velocity, Reaction (Psychology), Simulation, Load distribution, Positioning reactions, Oscillographs, Photography, Analysis, High speed photography, Aviation personnel, Human engineering, Face.

This report presents a comparative examination of the reactions of human subjects to simulated crash acceleration forces, when seated in a standard Navy passenger seat aligned in either the forward or aft facing position. Environmental parameters such as seat acceleration, end velocity; anthropomorphic dummy motion and acceleration; human subject motion and acceleration; and distribution of seat member loads during a series of simulated crashes are discussed. (Author)

PB 158 559 $5.60

Biotechnology Lab., U. of California, Los Angeles.
ARM PROSTHESIS RESEARCH. OBSERVER PRACTICE. HUMAN THERMAL STUDIES. HUMAN TRACKING, by John Lyman. Progress rept. on Contracts V1005M-2075, Nonr-233(49), AF 33(616)5402 and N123(60530)16361A. 15 Dec 60, 54p. 1 ref. Engineering Dept. rept. no. 60-109; AD-251 739.

DESCRIPTORS: *Prosthetics, *Artificial limbs, *Muscles, Electrical properties, Test equipment, Joints, *Joints (Physiology), *Neuromuscular transmission, Sensory perception, *Motor reactions, *Heat tolerance, *Tracking, Learning, Training, Test methods, Reaction (Psychology), Torque.

Contents:
Fundamental studies to establish body control sites for application to externally powered prostheses: Electromyographic studies; Surgical nerve replants; Evaluation of existing externally powered prostheses.
Engineering analysis of biotechnical factors in control systems: Kinetic and kinematic analysis of prosthesis control motions; Sequential analysis of time-separated prosthesis control functions; Socket fit studies.
Sensory-motor and feedback investigations: Control engineering state of the art surveys; Methods development and special design investigations.
Physiological measurements of human thermal tolerance
Effectiveness of elimination of displayed information with observer practice increase: Interaction of display redundancy and display complexity during training; Determination of a hierarchy of perceptual usefulness of geometrical cues in a dial reading task
Research on the performance of human operators of tracking instruments.
(See also PB 153 761)

PB 154 937 $11.10

Human Sciences Research, Inc., Arlington, Va.
MAJOR VARIABLES OF THE SMALL GROUP FIELD, by Irwin Altman and Anita Terauds. Rept. on Contract AF 49(638)256. Nov 60, 592p. 242 refs. HSR-RR-60/6-Gn; AFOSR-TN-60-1207; AD-250 740.

DESCRIPTORS: *Human engineering, Behavior, Scientific personnel, Scientific organizations, *Group dynamics.

A program to integrate small group research knowledge is described. The objective of the program is to develop methods for the organization of knowledge in the small group field. As one facet of this work, major variables of the field are reviewed. The review includes descriptions of variable subclasses, information about rates of appearance, and results of each variable's association with other variables. In addition, a special review of individual and group performance effectiveness variables in presented. (Author)

AD-259 082 $2.60

Laboratory of Aviation Psychology, Ohio State U. Research Foundation, Columbus.
WORK TEAM EFFECTIVENESS AS A FUNCTION OF MECHANICAL DEGRADATION OF THE INTRATEAM COMMUNICATION SYSTEM, by J. S. Kidd. Final rept. on Contract AF 19(604)6665. May 61, 24p. 22 refs. RF Proj. 1096; ESD Technical note 61-57.

DESCRIPTORS: Achievement tests, *Adjustment (Psychology), Air traffic control systems, Radar equipment, Control simulators, *Noise, Signal-to-noise ratio, Effectiveness, *Voice communication systems, Deterioration, Tests, Test methods, *Verbal behavior, Reaction (Psychology), Feedback, *Group dynamics, Operations research, Radio operators, Human engineering, Intelligibility, Air traffic controllers, Speech, *Psychoacoustics, Communication systems.

A simulated radar air traffic control task was used as a setting for assessing the effects on team performance of various types of mechanical degradation of the communications subsystem. Three experiments were performed. In the first, channel noise, signal-to-noise ratio, and traffic density factors were evaluated. While no interaction between noise and traffic density was observed, it was clear that maintaining a high S/N ratio could prevent most of the deleterious effects of high noise levels. A second experiment compared various frequency pass band conditions with the outcome revealing that the higher frequencies are most susceptible to interference. The third experiment compared degree of channel interruption and evaluated techniques for overcoming this form of interference. Over-all results indicate the importance of feedback and the role of sender-receiver cooperation in overcoming communications barriers. (Author)

PB 156 264 $22.25

American Inst. for Research, Washington, D. C.
IDENTIFICATION, DEVELOPMENT AND UTILIZATION OF HUMAN TALENTS: DESIGNING AND STUDY, by John C. Flanagan, John T. Dailey and others. Project Talent Monograph Series no. 1; Final rept. on Contract Nonr-2596(00). June 60, 434p. 103 refs. AIR-269-60-FR-235; AD-251 327.

DESCRIPTORS: Personnel, *Students, *Learning, *Education, *Psychometrics, Classification, Sampling, Vocational tests, Intelligence tests, Aptitude tests, Attitudes, Reasoning, Personality tests, Achievement tests, *Research program administration, Test methods.

The administration of and planning for America's first census of the aptitudes, achievements, and talent potentials of its youth is described. The selection of students and schools to be sampled is discussed, and the test batteries used are described from their construction to the processing and analysis of the data obtained. Backgrounds and a description are also presented for: (1) the Student Activities Inventory; (2) the Interest Inventory; (3) the Student Information Blank; (4) the General School Characteristics Questionnaire; (5) the Guidance Program Questionnaire; and (6) the Counselor's Questionnaire. Possible applications are discussed for two themes that were utilized in the test batteries. Finally, the expected results to be gained from the survey, and the rationale of future volumes in the series are presented.

PB 158 028 $3.60

Amherst Coll., Mass.
PROJECTIVE STUDIES OF FEAR OF FAILURE, by Robert C. Birney, Harvey Burdick (Smith Coll.), and Richard Teevan (Bucknell U.). Annual rept. on Contract Nonr-2309(02). Nov 60, 34p. AD-250 517.

DESCRIPTORS: *Fear, *Anxiety, Personality, *Personality tests, Determination, *Psychometrics, Statistical analysis, Needs

A scoring system was produced which reflects variation in failure experience and permits interpretation as a measure of fear of failure. The system is called the Hostile Press system because the thema scored emphasize the reactions of story figures to threatening Press. Two cross-validations of the system were obtained. One experiment designed to replicate the original source experiment failed to do so for reasons discussed in this report. Additional studies of other scoring possibilities were carried out as well as further efforts to learn more of the level of aspiration measure. This report contains the initial level of aspiration experiment, the Hostile Press scoring system, and the further exploration of the level of aspiration device. (Author)

PB 158 616 $2.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
RESPONSE STRENGTHS AND CHOICE PROBABILITY: A CONSIDERATION OF TWO COMBINATION RULES, by Gordon H. Bower. Technical rept. no. 36 on Contract Nonr-225(17). 19 Dec 60, 28p. 12 refs. AD-248 805.

DESCRIPTORS: Combinatorial analysis, Test methods, *Behavior, Factor analysis, Learning, *Reaction (Psychology), Reasoning, Statistical analysis, *Probability.

Consideration is given to the following problems: given two competing responses with known strength, what is the composition, or combination, rule by which choice probability is related to the strengths of the separate responses. Two theories are considered: (1) Thurstone's theory which assumes that the probability of choosing response A over B is an increasing function of the difference in strengths of the two responses, and (2) Luce's theory which assumes that the choice of A over B is determined by the ratio of their strengths. The discussion shows that there are extra constraints on the decision about suitable rules by which alternative response strengths may be combined. The extra constraint arises from a detailed analysis and representation of the component behaviors of a subject during the act of choosing. A model of what goes on during a single act of choice by an individual is presented. Some direct empirical support for this model are discussed, and Luce's ratio test is shown to fall directly as a theorem from this representation of the behavior of a subject at a choice point.

PB 157 418 $1.60

Bethany Coll., W. Va.
ON THE SEARCH MECHANISM IN PROBLEM SOLVING, by Wilbert S. Ray. Technical rept. no. 5 (Final rept.) on Contract Nonr-2315(00). Oct 60, 10p. 17 refs. AD-245 860.

DESCRIPTORS: *Reasoning, Reaction (Psychology), Probability, Errors, Inhibition.

A suggestion has been made that the search mechanism used by a problem solver in attempting to find the relation which provides his solution may exhibit several characteristics. The area of the cognition and the size of the relation within it will inversely influence the probability of success. In the search mechanism the span, and perhaps the rate, are important. The path which the search takes through the cognition will be influenced by features of the mechanism such as its being set for some particular sort of thing, and by features of the cognition such as congruity among elements in a sub-set. The experiments quoted here are not tests of the model offered, but are rather, attempts to show that the concepts of which the model is built are concepts of a sort which can be manipulated in the laboratory. (Author)

PB 157 354 $2.60

Georgetown U., Washington, D. C.
HUMAN ADJUSTMENT TO ANTARCTIC ISOLATION, by John R. Rohrer. Rept. on Contract Nonr-1530(07). Sep 60, 27p. 6 refs. AD-246 610.

DESCRIPTORS: *Adjustment (Psychology), Antarctic regions, *Stress (Psychology), Separation, *Anxiety, Fear, Inhibition, *Group dynamics, *Personality, *Behavior, Hearing, Sensitivity.

A discussion of problems of human adjustment experienced by men who wintered over in the Antarctic is presented. Three rather different levels of behavior were described. First, there was the cyclic adjustment that the men made to the Antarctic. This consisted of heightened anxiety on entrance into the Antarctic; a period characterized by heightened depression, that covered most of the dark winter months; then a period characterized by the occurrence of anticipatory behavior preparatory to leaving the Antarctic. The second class of data had to do with the interpersonal transactions in the small stations, and the types of ego defense mechanisms that the men used during this period of time. The third class of descriptive material was concerned with the occurrence of adjustive phenomena, apparently unique to life in Antarctica. One consisted of what has been called the Long Eye; a condition produced by depriving an individual of interpersonal transactions with the group. The second phenomena has to do with increased sensitivity to auditory stimulation. It was pointed out that all the generalizations arrived at appear to have some validity relative to adjustment problems made to the Antarctic. (Author)

PB 157 356 $1.10

Georgetown U., Washington, D. C.
A TEST FOR THE IDENTIFICATION OF PERSONALITY AND CHARACTER DISORDERS, by John H. Rohrer. Rept. on Contract Nonr-1530(07). Sep 60, 10p. 3 refs. AD-246 611.

DESCRIPTORS: *Personality, *Abnormal psychology, *Personality tests, Behavior, Identification, *Psychometrics, Perception, Statistical analysis.

The construction of two forms of a test aimed at rapid identification of personality disorders is described. Both forms of the test appear to be tapping largely the unconscious mentations of the individual. Each of the two forms were highly successful in discriminating between the character disordered groups and the groups who had successfully completed boot training. Procedures of cross validating each of the two forms are now in progress. (Author)

PB 157 492 $1.60

Louisiana State U. [Baton Rouge].
OBJECTIVE COMPARED WITH SUBJECTIVE MEASURES OF THE SAME BEHAVIOR IN GROUPS, by Ernest B. Gurman (Mississippi Southern Coll.) and Bernard M. Bass. Technical rept. no. 23 on Contract N7onr-35609. Oct 60, 19p. 10 refs. AD-246 991.

DESCRIPTORS: *Group dynamics, *Behavior, Reasoning, *Leadership, Perception, Sociometrics, Test methods, Statistical analysis, Reliability, Analog computers.

The relationships between subjective and objective assessments of group behavior were investigated. Discussion behavior was measured objectively by a social analog computer, while subjective assessments

were made by observers and participants aided by a check list. There tended to be agreement between the two different methods of measurement, not accounted for by mutual correlations with irrelevancies, suggesting that both objective and subjective measurements were concerned with the constructs. Observers and participants had difficulty in inferring private events that took place during the discussion. The difficulty of rating private events suggested that observers' ratings are most appropriate for overt events. Yet the successful study of covert events requires reliance on objective measurement. (Author)

PB 158 040 $1.60

Louisiana State U., Baton Rouge.
TEST OF A PROPOSED THEORY OF LEADERSHIP, by Bernard M. Bass. Annual rept. no. 6, Nov 59-Nov 60, on Behavior in Groups, Contract N7onr-35609. 15 Nov 60, 12p. 9 refs. AD-246 993.

DESCRIPTORS: *Leadership, *Behavior, *Group dynamics, Theory, Effectiveness, Training, Psychometrics, Personality tests, Statistical analysis.

A summary of research reports completed and in progress. (See also PB 150 542)

PB 158 041 $1.60

Louisiana State U. [Baton Rouge].
A TEST OF THE PROPOSITION: WE WANT TO BE ESTEEMED MOST BY THOSE WE ESTEEM MOST HIGHLY, by Cecil R. Wurster, Bernard M. Bass, and Wayne Alcock. Technical rept. 28 on Behavior in Groups, Contract N7onr-35609. Nov 60, 15p. 2 refs. AD-246 992.

DESCRIPTORS: *Leadership, Personality, *Behavior, *Group dynamics, Theory, Test methods, Statistical analysis, *Sociometrics, Psychotherapy.

The present study demonstrates the adequacy of a considerably sharpened hypothesis that we tend to select as desired recipients of favorable information about ourselves those people we esteem most highly. About 90% of 110 students tended to designate friends more frequently as a preferred recipient of favorable information about the student, the more highly they esteemed these friends. About 10% of the students took a reverse tack singling out those at the bottom of their esteem hierarchy for attention to favorable information about themselves. In a university setting, social esteem appeared somewhat more productive of being mentioned as a preferred recipient of favorable social or scholastic information but scholastic esteem was more specifically associated with mention as a preferred recipient of scholastic information. (Author)

PB 158 031 $1.60

Ohio State U. Research Foundation, Columbus.
ORIGINALITY IN GROUP PRODUCTIVITY, by Pauline N. Pepinsky and Harold B. Pepinsky. Annual summary rept. 16 Nov 59-15 Nov 60, on Contract Nonr-495(15). 15 Nov 60, 11p. RF Proj. 798, rept. no. 12; AD-249 201.

DESCRIPTORS: *Group dynamics, *Behavior, Production, *Management engineering, *Leadership, Sociometrics, Test methods, Effectiveness, *Industrial relations, Acceptability.

This research is directed toward the identification and measurement of behaviors that are independent and original, but contribute to group productivity; and the determination of conditions leading to such behaviors, and the experimental testing of such effects.

PB 158 100 $7.60

Princeton U., N. J.
A SUCCESSIVE INTERVALS ANALYSIS OF COLOR DIFFERENCE, by Carl Helm. Technical rept. on Mathematical Techniques in Psychology, Contract Nonr-1858(15) and National Science Foundation Grant G-3407. Nov 60, 72p. 16 refs. AD-250 026.

DESCRIPTORS: *Psychometrics, *Color vision, *Colors, Mathematical analysis, Measurement, Quantitative analysis, Statistical analysis, Test methods, Theory.

Mellinger obtained a six-dimensional color space as the result of a multidimensional scaling experiment, rather than a three-dimensional model which would have been expected in terms of classical color theory. In the present experiment, a comparison of different subjects indicated a very high degree of uniformity in the subjects' responses. The analysis yielded a twelve-dimensional multidimensional scale rather than the two-dimensional scale which would have been predicted by classical color theory. Upon transforming the interpoint distances by an exponential transformation and carrying out a reanalysis using the transformed distances, a two-dimensional multidimensional scale resulted. The configuration of stimuli within this two-dimensional multidimensional scale conformed very closely to the predictions of classical color theory. Mellinger's data were then obtained and reanalyzed after being appropriately transformed. The result obtained here was also much more nearly in conformity with the predictions of classical color theory. (Author)

PB 155 719 $1.60

Psychometric Lab., U. of North Carolina, Chapel Hill.
BAYES ESTIMATION OF PROPORTIONS: THE EFFECT OF STIMULUS DISTRIBUTION AND EXPOSURE TIME, by Emir H. Shuford and Raymond A. Wiesen. [Research memo.] no. 23 on Contract AF 49(638)729 and Public Health Service Grant M-3103-A. Dec 59, 17p. 17 refs. AFOSR-TN-59-1311; AD-232 826.

DESCRIPTORS: Psychology, Theory, Probability, Statistical analysis, *Psychometrics, *Psychomotor tests, *Games theory, Statistical distributions, Sampling

The direct magnitude estimation of proportion was studied as a function of stimulus distribution and exposure time. The results were interpreted in terms of a specific decision theory model which takes into account

both the reliability of the subject's observation and the frequency of the subject's experience with each stimulus value. Application of this model yielded estimates of the number of elements sampled from each random matrix and of the distribution of a priori probabilities assumed by each subject. Examination of these estimates for each subject over successive 90-trial blocks suggested that most of the subjects were affected by changes in the stimulus distribution and in exposure times, but that different subjects displayed somewhat different patterns of response. The majority of the subjects appeared to be using an all-or-none performance criterion. Results were discussed and interpreted with a view toward the design of further experiments aimed at testing the decision-theory model. (Author)

PB 158 562 $2.60

Washington U., Seattle.
COMPUTER APPLICATION TO PSYCHOLOGICAL PROBLEMS, by Paul Horst, August Dvorak, and Calvin Wright. Rept. on Contract Nonr-477(08) and Public Health Research Grant M-743(C5). Dec 60, 28p. 36 refs. AD-248 381.

DESCRIPTORS: *Psychology, *Digital computers, *Programming, Mathematical prediction, Matrix algebra, *Psychometrics, Reliability, Transformations (Mathematics), Classification, Complex variables, Factor analysis, Behavior, Personality tests, Social sciences.

A discussion of computer applications to psychological problems is developed around various types of computer programs which have been written to aid in the solution of particular problems. The discussion is organized in terms of the topics; transformations of measures, simple matrix operations, optimal transformations, optimal classification, matrix approximation and factor analysis, model testing, relations among m sets of variables, and special problems. (Author)

BIOLOGICAL SCIENCES

AD-259 073 $1.60

Air Crew Equipment Lab., Naval Air Material Center, Philadelphia, Pa.
PRELIMINARY INVESTIGATION OF BACTERIAL VIABILITY AND VIRULENCE IN CLOSED ECOLOGICAL SYSTEMS, by Perry R. Tiller. Rept. on Environmental Requirements of Sealed Cabins for Space and Orbital Flights. 14 June 61, 13p. 10 refs. Rept. no. NAMC-ACEL-449.

DESCRIPTORS: *Closed-cycle ecological systems, Space capsules, Spaceships, *Bacteria, Simulation, Temperature, Oxygen, Growth, Viability, Infections, Orbital flight paths, Hydrogen ion concentration, Culture media, High altitude

Six types of bacteria were exposed to a simulated altitude of 27,000 feet for 24 hours. The temperature was maintained at 37°C (±1°), and 100% oxygen was provided. Control cultures for each of the bacteria studied were maintained at sea level (with 21% oxygen present) and the temperature maintained in the same manner. No differences were found between the experimental and control groups with regard to growth rate, pH, or virulence in vitro. (Author)

PB 156 494 $2.60

Army Chemical Research and Development Labs., Army Chemical Center, Md.
HEALTH HAZARDS OF MILITARY CHEMICALS: REPORTS PUBLISHED TO 1 FEBRUARY 1961, by Leona W. Hendrix and Keith H. Jacobson. Mar 61, 24p. 219 refs. CRDL Special pub. 2-41.

DESCRIPTORS: Public health, Chemical warfare agents, *Bibliography, *Military medicine, *Military chemicals, *Toxicity, Acetylene derivatives, Ammonia, Anilines, Boron compounds, Carbon compounds, Monoxides, Cleaning fluids, Epoxides, Fluorides, Furfuryl alcohols, Halocarbons, Hydraulic fluid, Lubricants, Hydrazine derivatives, Hydrocarbons, Hydrogen compounds, Peroxides, Nitric acid, Nitrogen compounds, Oxides, Nitro radicals, Nitrates, Nitrites, *Hazards, *Military personnel.

Reports are listed under: Acetylene derivatives; Ammonia; Aniline; Boron compounds; Carbon monoxide; Cleaning agents; Epoxides; Fluorine compounds; Furfuryl alcohol; Halogenated hydrocarbons; Hydraulic and lubricating fluids; Hydrazine and derivatives (including nitrosodimethylamine); Hydrocarbons; Hydrogen peroxide; Nitric acid, Nitrogen oxides; Nitro compounds, nitrites and nitrates; Miscellaneous; and General.

PB 158 654 $1.60

Marine Lab., U. of Miami, Coral Gables, Fla.
SALT WATER FUNGI, by Ernest S. Reynolds, S. P. Meyers and others. Final rept. 1 Sep 55-31 Aug 60, on Contract Nonr-1811(00). 11p. 19 refs. ML-60259; AD-250 005.

DESCRIPTORS: *Fungi, Wood, Ecology, Growth, *Marine biology, Culture media, Nutrition, Lignin, Cellulose, *Yeasts, Identification, Classification, Physiology, Reproduction, Fungus deterioration, *Bacteria.

Contents:
Summary of results
Bibliographical studies
Development of methods of submergence and subsequent analyses of infested wood
Anatomical analyses
Ecological investigations
Laboratory culture studies
Investigations of cellulolytic activity
Studies of attack on lignin-cellulose substrates
Investigation of actinomycetales occurring in the marine environment
Concurrent related mycological research program
Systematics of pelagic fungi
Biology and ecology of marine yeasts
Concurrent bacteriological research programs
(See also PB 147 718)

Anatomy and Physiology

PB 158 581 $2.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
A STOCHASTIC PROCESS ARISING IN THE STUDY OF MUSCULAR CONTRACTION, by Samuel W. Greenhouse. Technical rept. no. 66 on Contract Nonr-225(52). 5 Dec 60, 2p. 1 ref. AD-249 688.

DESCRIPTORS: *Muscles, Physiology, Mathematical analysis, *Statistical processes, *Probability, Difference equations, Matrix algebra.

Assume two parallel line segments of indefinite length; one is fixed and the other is moving in a linear direction parallel to the fixed line. Along the fixed line there are special points equally spaced (positions); on the moving line, there exist equally spaced points (sites). A site which is vacant can become filled at certain positions (load positions); similarly, a site which is filled can become vacant at the remaining positions (release positions). An arbitrary fixed starting position on the fixed line is assumed with the positions numbered consecutively beyond the starting position, and the release and load positions alternate so that the odd numbered positions are release positions and the even numbered ones are load positions. Under certain assumptions, the question posed is the probability a site will be filled (or vacant) after a transit of n positions. The model is then extended to the case where a site can be in any one of the $(m + 1)$ states, and the analogous question posed is the probability the site will be empty, filled or in any arbitrary state j after a transit of n positions. The model is related to the Podolsky's theory concerning the mechanism of muscular contraction. (Ann. N. Y. Acad. Sci. 72:522-537, 1959). (Author)

PB 157 625 $3.60

Armed Forces-NRC Committee on Hearing and Bio-Acoustics, St. Louis, Mo.
THE PROBLEMS OF CRITERIA FOR NOISE EXPOSURE, by Donald H. Eldredge. Rept. on Contract Nonr-2300(05). Oct 60, 32p. 46 refs. AD-245 980.

DESCRIPTORS: *Noise, *Hearing, Physiology, Standards, Ear, Injuries, Hazards, Audiometry, Deafness

Contents:
Purposes of the criterion
Methods for describing noise exposure
Methods for evaluating hearing impairment
The relations of noise exposure to hearing impairment
Practical application of a useful standard and monitoring audiometry

PB 159 105 $1.60

Army Medical Research Lab., Fort Knox, Ky.
HEARING LOSSES OF PERSONNEL EXPOSED TO IMPULSE AND STEADY STATE-NOISE, by John L. Fletcher. Rept. on Psychophysiological Studies. 11 Aug 58, 13p. 1 ref. Rept. no. 355.

DESCRIPTORS: *Hearing, *Noise, *Deafness, Auditory acuity, Personnel, Combat noise, *Military personnel, Acoustics, Sound.

Hearing losses of personnel exposed to impulse and steady noise for 1 to 79 months are of the same magnitude and type. For those who are exposed over 80 months, steady noise exposure appeared to produce somewhat greater hearing losses than impulse noise. Apparent screening effects were noted in the 1-to-39- and 40-to-79-month exposure groups. (Author)

PB 158 063 $2.60

Psycho-Acoustic Lab., Harvard U., Cambridge, Mass.
PERIODIC STATUS REPORT 36. Rept. for 16 May-15 Nov 60 on Contract Nonr-1866(15) and National Science Foundation Grant G-10716. 15 Nov 60, 22p. 100 refs. PNM-88; AD-246 882.

DESCRIPTORS: Scientific research, *Psychoacoustics, Nerves, *Sensory perception, Eye, Skin, Stimulation, Intensity, Theory, Brightness, Dark adaptation, Light adaptation, Visual perception, Measurement, Learning, Auditory perception, Conditioned reflex, Visual thresholds, Fatigue (Physiology)

PB 159 092 $4.80

Psychological Corp., New York.
THE EFFECTS OF ULTRASONIC VIBRATIONS ON MAN, by Grace S. Chan. Rept. on Contract N6ori-151, T.O. 1, 15 Apr 48, declassified 5 Nov 53, 48p. 34 refs. Rept. no. 151-1-15; ATI-54 744.

DESCRIPTORS: *Man, *Ultrasonics, Vibration, *Ultrasonic radiation, *Physiology, *Psychology, Jet engine noise, Flutter, Supersonic flight, Pilots, Tests.

There are satisfactory demonstrations of some of the effects of ultrasonic energy when applied locally to man. In general, heat develops at the site of application and appropriate sensory stimulation results. Spectral analyses of the noise obtained near turbo-jet engines on the ground or aircraft in flight show that both sonic and ultrasonic vibrations are produced. Under the conditions studied, sonic components exceed the ultrasonic components in intensity. Intensity levels appear to be reduced as engine speed decreases. There is evidence that, with increasing air speed, the overall intensity level of the noise increases and strong energy components may appear at ultrasonic frequencies as well as in the audible range. According to one study, this tendency is exaggerated as the speed approaches a Mach number of 1.0. If it is established that exposure to vibrations from current type engines or aircraft is harmful, such effects would appear to be more closely related to the high intensities involved rather than the high frequencies arising from these sources. Protection of the pilot against audio frequencies may be necessary.

Biochemistry

BNL-685(T-232) $0.50

Brookhaven National Lab., Upton, N. Y.
CURRENT IDEAS ON THE ENDOCRINE REGULATION OF CELLULAR PROCESSES, by Irving L. Schwartz. Brookhaven lecture series no. 2. Dec 60, 21p.

PB 159 137 $1.60

Henry Ford Hospital, Detroit, Mich.
EXPERIMENTAL STUDIES ON ENZYME SYSTEMS, by Thomas P. Singer and Edna Kearney. Annual progress rept. 10 Feb-25 Nov 60, on Contract Nonr-1656(00). 23 Nov 60, 12p. 56 refs. AD-248 868.

DESCRIPTORS: Separation, *Dehydrogenases, *Cytochromes, Cells (Biology), *Peptides, Purification, Oxidation, Heart, *Yeasts, *Flavins, Enzymes.

Contents:
Isolation and properties of DPNH dehydrogenase from heart
Improved method for the isolation of mammalian succinic dehydrogenase
Comparison of the flavoprotein succinic dehydrogenase with the so-called succinic coenzyme Q-reductase
Further studies of the various lactic dehydrogenases of yeast

PB 158 085 $1.10

Michigan U. School of Medicine, Ann Arbor.
ORGANO-TIN TOXICOLOGY, by Theodore M. Brody. Annual progress rept. 1 Dec 59-30 Nov 60, on Contract Nonr-1224(27). 30 Nov 60, 5p. 3 refs. AD-248 879.

DESCRIPTORS: Amines, Organic compounds, Toxicity, *Tin compounds, Epinephrine, Ethyl radicals, *Adrenal glands, *Heart, Serotonin, *Biochemistry, Tissues (Biology), *Brain, Histological sections, Liver.

Mitochondrial swelling as evidenced by a decrease in optical density was always obtained with concentrations of triethyltin (TET) as low as 1 x 10-7M. The swelling induced by TET was unaffected by the addition of ethylenediamine tetracetate (EDTA) indicating that the swelling observed was not the result of an impurity such as inorganic tin. It was also demonstrated that TET inhibits the ATP reversal of swelling induced by thyroxin. TET-induced swelling (10-7M TET) could be reversed by ATP addition, less readily by ADP and not at all by AMP. Further, the addition of Mn ion together with the ATP seemed to potentiate the reversal. With this combination it was possible to reverse TET-induced swelling when TET was present in concentrations as high as 10-4M. When 2, 4 dinitrophenol (2, 4 DNP) was added to the medium prior to TET addition, it effectively prevented the usual swelling.

TID-13668 $1.10

Missouri Agricultural Experiment Station, Columbia.
STUDY OF THE INHERITANCE OF PRODUCTIVE PROCESSES IN DOMESTIC ANIMALS BY ENDOCRINE METHODS USING RADIOACTIVE ISOTOPES AS TRACERS. Progress rept. for 1960-1961, on Contract AT(11-1)-301. Sep 61, 10p.

PB 158 635 $10.10

[Stanford U. School of Medicine, Calif.]
THE INFLUENCE OF ABNORMAL ANIONS AND k-STROPHANTHOSIDE ON THE MECHANICAL RESPONSE AND ELECTROLYTE PATTERN OF DRIVEN RAT VENTRICLE, by S. T. Taketa and G. A. Feigen. Final rept. on Selected Problems in Molecular Biology, Contract Nonr-225(22). 31 Dec 60, 121p. 83 refs. AD-248 094.

DESCRIPTORS: *Ions, *Electrolytes (Physiology), Drugs, Rats, Heart, *Cardiac muscle, Glucose, Sodium, Potassium, Nitrates, Thiocyanates, Chlorides, *Cardiac glycosides, Cells (Biology), Biochemistry, Biophysics.

Contents:
Influence of abnormal anions on the contractile response of driven rat ventricles
The relationship between contractility and pattern of electrolytes in driven rat ventricles

Pathology

PB 158 652 $1.60

Catholic U. of America, Washington, D. C.
SPURIOUS CORRELATION OF THE AGE OF ONSET, WITH SPECIAL REFERENCE TO ATOPIC DISEASES, by Edward Batschelet. Rept. on Contract Nonr-2249(05). Dec 60, 11p. 9 refs. AD-248 395.

DESCRIPTORS: *Allergy, *Age, Age factors, Statistical analysis, Statistical functions, Probability, Theory, *Asthma, Genetics, Respiratory diseases.

TID-13121 $6.60

Massachusetts General Hospital, Boston
EXTERNAL LOCALIZATION OF BRAIN-TUMOR EMPLOYING POSITRON-EMITTING ISOTOPES. Progress rept. 1 July 60-1 June 61, on Contract AT(30-1)-1242. 52p.

PB 157 918 $1.60

Texas U. Medical Branch, Galveston.
INITIAL CLINICAL REACTION TO THERAPEUTIC WHOLE-BODY X-RADIATION. SOME CIVIL DEFENSE CONSIDERATIONS, by William C. Levin, Martin Schneider, and Herbert B. Gerstner (School of Aviation Medicine). Nov 59, 11p. 14 refs. AFSAM 60-1; AD-231 543.

DESCRIPTORS: *Radiation injuries, *X-rays, Therapy, Civilian defense systems, Physiology, Psychology, Tranquilizing drugs.

Early clinical events displayed, by 11 cancer patients after whole-body roentgen treatment in a single large dose are compared with previous reports on radiation sickness and with acute sequelae observed in nuclear accidents. From this comparison, the typical initial reaction to penetrating radiation in the several-

hundred-roentgen range emerges as follows: signs and symptoms--essentially in form of fatigue, nausea, and vomiting--begin to develop within 2 to 4 hr after exposure; they reach a climax between 5 and 8 hr after exposure; and they subside on the second or third day. During the intense phase of the disturbance, extending from approximately 4 to 10 hr postexposure, about 60% of the irradiated persons experience disability of various degrees. Despite its transitory nature, the reaction may present a major medical problem in civil defense situations because of coincidence and, thereby, of interference with evacuation plans and first-aid procedures. Therefore, the early sequelae of exposure to penetrating radiation require the attention of all physicians who may have to manage such emergencies. (Author)

Radiobiology

ANL-6398 $2.50

Argonne National Lab., Ill.
RADIOLOGICAL PHYSICS DIVISION. Semiannual rept. Jan-June 61, on Contract W-31-109-eng-38. Sep 61, 134p.

UCSF-21 $2.25

California U., Berkeley. School of Medicine, San Francisco.
THE RADIOLOGICAL LABORATORY. Progress rept. for period ending 30 Sep 61, on Contract AT(11-1)-GEN-10. 76p.

UCD-103 $0.50

California U., Davis. School of Veterinary Medicine.
DEVELOPMENT OF THE OVARY IN THE BEAGLE, by A. C. Andersen and M. E. Simpson. Rept. on Contract AT(11-1)-GEN-10. Aug 61, 20p.

TID-13216 $9.60

Iowa State U. of Science and Technology, Ames.
A QUANTITATIVE STUDY OF LIFETIME SICKNESS AND MORTALITY AND PROGENY EFFECTS RESULTING FROM EXPOSURE TO PENETRATING IRRADIATION. Rept. on Contract AT(11-1)-107. Aug 61, 116p.

TID-13180 $6.60

John Hopkins U., Baltimore, Md.
CELL MEMBRANE PERMEABILITY AND ACCUMULATION OF IONS, by Robert Ballentine and Dorothy D. Burford. Progress rept. and six year summary of research on Contract AT(30-1)-1822. July 61, 64p.

TID-13360 $1.60

Minnesota U., Minneapolis.
PROGRESS REPORT, 1 June 60-1 June 61, on Contract AT(11-1)-838. Aug 61, 15p.

TID-13420 $1.10

New England Deaconess Hospital, Boston, Mass. and Harvard Medical School, Boston, Mass.
THE NATURE OF THE RADIOSENSITIVE CELLS IN THE DEVELOPING NERVOUS SYSTEM STUDIED WITH TRITIATED THYMIDINE, by Samuel P. Hicks, Constance J. D'Amato and David L. Joftes. 6p.

CHEMISTRY

PB 144 106-S-1 $2.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
HYDRAZOIC ACID AND THE METAL AZIDES (A LITERATURE SURVEY), by Hyman Rosenwasser. 14 Dec 59, 22p. 118 refs. Rept. 1551-TR, Supplement I; AD-232 490.

DESCRIPTORS: *Metallic compounds, *Azides, *Organic azides, *Acids, Hydrogen compounds, Bibliography, Chemical properties, Physical properties, Molecular structure, Crystal structure, Complex compounds, Explosives, Ammonium radicals, Alkaline earth compounds, Alkali metal compounds.

Included in this supplement are recent data on organic azides as well as a few references on studies of initiators other than azides. (Author)

BNL-691(T-236) $1.00

Brookhaven National Lab., Upton, N. Y.
SOME METHODS OF PREPARING TETRAVALENT URANIUM SOLUTIONS, by H. Katz. Sep 61, 40p.

TID-13297 $4.60

Connecticut U., Storrs.
ANALYTICAL CHEMISTRY AT LOW CONCENTRATIONS, by John T. Stock. Annual rept. no. 5 on Contract AT(30-1)-1977. July 61, 46p.

UCRL-9842 $2.50

Lawrence Radiation Lab., U. of California, Berkeley.
HYDROBORATE CHEMISTRY, by Robert Mesmer. Rept. on Contract W-7405-eng-48. Aug 61, 129p.

PB 158 026 $1.10

Noyes Chemical Lab., U. of Illinois, Urbana.
THE EFFECT OF MAGNETIC NON-EQUIVALENCE IN A_2B_2 NMR SPECTRA, by David M. Grant and H. S. Gutowsky. Technical rept. no. 36 on Contract Nonr-1834(13). 1 Nov 60, 5p. 4 refs. AD-249 456.

DESCRIPTORS: *Nuclear magnetic resonance *Protons, Spin, Lactones, Ethylenes, Carbonates, Cyclopropanes, Bromides, Furan, *Monocyclic compounds, Spectrographic analysis

The proton magnetic resonance spectra of beta-propiolactone, ethylene monothiocarbonate, trans-dibromocyclopropane and 2, 3-dihydrofuran were

interpreted by the several workers on the basis of equal cis and trans spin-spin coupling between the A and B nuclei in the A_2B_2 groups. These molecules have cyclic structures such that internal motional averaging about the carbon-carbon bonds is not possible, and, therefore, the cis coupling J is not necesarily the same as the trans, J'. The proposed equality of the coupling constants (J = J') was explained in each case as accidental. However, the calculations demonstrate that such a spectral assignment is not unique and that the magnetically equivalent A_2B_2 spectrum can be duplicated with a magnetically non-equivalent assignment. (Author)

ORNL-3176 $2.50

Oak Ridge National Lab., Tenn.
CHEMISTRY DIVISION. Annual progress rept. for period ending 20 June 61, on Contract W-7405-eng-26. 112p.

Organic Chemistry

PB 157 357 $9.10

Mallinckrodt Chemical Lab., Harvard U., Cambridge, Mass.
THE REACTION OF ETHERS WITH SILICON, by Jerold J. Zuckerman. Thesis. Technical rept. on Contract Nonr-1866(13). Sep 60, 110p. 120 refs. AD-249 714.

DESCRIPTORS: *Ethers, *Silicon, *Chemical reactions, *Halogens, Chlorine, *Silanes, Chemical bonds, Energy, Pressure vessels, Organic compounds

The reaction of ethers with silicon (in all forms) does not proceed as stated by Yamada and Yasunaga (Japanese Patent 286, 1951; C. A. 47:3334, 1953), when halogens are excluded. When chlorine is present, even after extensive flushing, anisole reacts to give some silicon-containing products (principally chlorosilanes). In the absence of halogen, reaction between silicon and others can be attained in a pressure bomb under about 200 atmospheres of hydrogen or nitrogen, producing alkoxy- and aroxysilanes (especially tetraphenoxysilane from anisole) along with more complex polymeric aroxysiloxanes.

PB 157 405 $1.10

Massachusetts Inst. of Tech., Cambridge.
THE TRIPHENYLSILYLTRIPHENYLBORATE ANION AND ITS GERMANIUM ANALOG, by Dietmar Seyferth, Gunter Raab, and Samuel O. Grim. Technical rept. no. 4 on Contract Nonr-1841(43). [1960] 7p. 7 refs. AD-244 335.

DESCRIPTORS: Boron compounds, *Complex ions, Silicon compounds, *Germanium compounds, Phenyl radicals, *Organoboranes, *Metalorganic compounds, Organic solvents, Synthesis, Chemical reactions, Chemical bonds, Methanols, Lithium compounds, Borates.

Synthesis of compounds in which a B atom was bonded to Si or Ge are described. Li Triphenylsilytriphenylborate (I) and its Derivatives: A solution of triphenylsilyllithium added to triphenylborane (II) dissolved in THF resulted in a mildly exothermic reaction. After the reaction mixture was stirred for 2 hours, fine white crystals began to deposit. Three pure derivatives were prepared by adding to a MeOH solution of I, MeOH solutions of methyltriphenylphosphonium Br, tetramethylammonium Br, and KFl. Li Triphenylgermyltriphenylborate and its Derivatives: A solution of triphenylgermyllithium added to II in a solution of ethylene glycol dimethyl ether produced a white crystalline precipitate. The tetramethylammonium and methyltriphenylphosphonium derivatives of the crude Li salt were isolated in analytical purity by treatment of the crude salt with the respective bromides in MeOH solution. A separate experiment where the crude Li salt was converted to the MeOH-insoluble tetramethylammonium derivative showed that the triphenylgermyltriphenylborate anion represented a 65% yield. The strength of the Si-B bond was indicated by the failure of phenyllithium to displace the triphenylsilyl group to give triphenylsilyllithium and Li tetraphenylborate.

Physical Chemistry

IS-218 $2.75

Ames Lab., Iowa State U. [of Science and Tech.]
FURTHER STUDIES IN THE ELUTION OF COPPER AND NEODYMIUM FROM A CATION-EXCHANGE RESIN WITH AMMONIA-ETHYLENEDIAMINETETRAACETIC ACID SOLUTIONS, by Lyle Kay Matson and F. H. Spedding. Feb 60, 146p.

IS-329 $1.25

Ames Lab., Iowa State U. [of Science and Tech.]
ION-EXCHANGE ELUTION SEQUENCES WITH CHELATING ELUANTS, by Dean B. James and J. E. Powell. May 60, 55p.

IS-344 $1.25

Ames Lab., Iowa State U. [of Science and Tech.]
ION MOBILITIES IN FUSED SALTS, by Edward Dean Wolf and F. R. Duke. May 61, 54p.

BMI-1551 $0.75

Battelle Memorial Inst., Columbus, Ohio.
DIFFUSION COEFFICIENTS OF URANIUM AND CARBON IN URANIUM MONOCARBIDE, by Walston Chubb, Charles W. Townley, and Ralph W. Getz. Rept. on Contract W-7405-eng-92. Nov 61, 26p.

GA-2144(Rev.) $3.60

General Atomic Div., General Dynamics Corp., San Diego, Calif.
THE TRANSPIRATION METHOD, by Ulrich Merten and Wayne E. Bell. Rept. on Contract AT(04-3)-164. Sep 61, 35p.

SRO-45 $1.75

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
KINETICS OF THE REACTIONS INVOLVED IN THE FERRIC CHLORIDE ETCHING OF COPPER PHOTOENGRAVING PLATES, by W. H. Burrows, C. T. Lewis, Jr. and D. E. Saire. Final rept. 1 Apr 59-31 Mar 61, on Contract AT(38-1)-202. June 61, 78p.

PB 157 422 $1.10

Massachusetts Inst. of Tech., Cambridge.
HYDROGEN PEROXIDE LABORATORIES, by C. N. Satterfield. Quarterly periodic status rept. on Contract Nonr-1841(11). 30 Sep 60, 9p. 4 refs.
DSR 5-7476; AD-245 595.

DESCRIPTORS: *Hydrogen compounds, Peroxides, *Decomposition, Silver, Platinum, Temperature, Reynold's number, Vapors, Thermodynamics, Laboratory equipment.

Decomposition of H_2O_2 Vapor on Relatively Inactive Surfaces: H_2O_2 vapor decomposition in a Pt tabular reactor was investigated. Flow rates corresponded to Reynold's numbers of 900 to 5000. Surface temperatures ranged from 133° to 433°C; logarithmic mean concentrations of H_2O_2 were from 0.3 to 2.5 mol-%; total pressure was atmospheric. Plotting of the decomposition rates against concentration at constant temperature and Reynold's number revealed a straight-line relationship indicating a first-order, over-all reaction. From these plots, decomposition rates at constant concentration and temperatures were plotted against Reynold's number. Dependence of over-all decomposition rate on mass-transport rate was evident. Vapor Binding Phenomena in the Decomposition of Concentrated H_2O_2 on Ag: Studies were made in an apparatus in which H_2O_2 was exposed to the outside of a horizontal 1/2-in.-od and 3/8-in.-long Ag tube. Rate of decomposition was determined through rate of O evolution. Decomposition was determined as a function of H_2O_2 concentration (0 to 90 wt-% H_2O_2) from 0° to 132°C when the tube was not cooled. Maximum decomposition appeared at about 50 wt-% H_2O_2 and at a temperature of 93C; rate of decomposition at this point in terms of O evolution was 5500 ml/sq in.-minute. Decomposition of various concentrations of H_2O_2 (17 to 90 wt-%) as functions of temperature were interpreted graphically. The decomposition rates of the 70, 82, and 90 wt-% concentrations did not vary greatly. (See also PB 150 031)

PB 157 622 $1.60

Massachusetts Inst. of Tech., Cambridge.
SUPERSATURATION OF OXYGEN IN AQUEOUS HYDROGEN PEROXIDE SOLUTIONS, by Charles N. Satterfield. Rept. no. 57 on Contract Nonr-1841(11). 15 Oct 60, 16p. 5 refs. AD-245 169.

DESCRIPTORS: *Solutions, *Oxygen, Hydrogen compounds, Peroxides, Ultraviolet radiation, Decomposition, Supersaturation

Studies were conducted at 30°C showing the amount of O supersaturation as a function of H_2O_2 concentration by using the rotating cylinder method with aluminum, Teflon, and tin cylinders. The data indicated an unstable phenomenon but showed a definite decrease in the amount of O supersaturation at H_2O_2 concentrations above 50 wt-% H_2O_2. For an H_2O_2 concentration of 35 wt-%, the amount of supersaturation increased with temperature between 0° and 30°C and then leveled off at temperatures up to 50°C. For a given degree of agitation, the rate of desupersaturation increased with temperature. A solution of 0°C, while holding less oxygen, required more time to desupersaturate than one at 50°C. Furthermore, a 35 wt-% H_2O_2 solution that was first allowed to come to quiescent steady-state at room temperature subsequently showed a temporarily increased rate of bubble evolution as the bath temperature was lowered. The amount of O supersaturation was not significantly different between vessels equipped with aluminum, tin, and Teflon cylinders as stirrers. However, any difference might be obscured by the fact that the stirrer area was a small fraction of that of the Pyrex vessel. Moderate differences were also observed between two different Pyrex flasks. In the studies on effect of temperature, H_2O_2 contained in one Pyrex flask consistently showed O supersaturation about 20% higher than that in a second flask. The effect was caused by the flask surface and not the H_2O_2, as shown by studies with different batches of H_2O_2.

TID-14096 $1.60

Michigan U., Ann Arbor.
POLAROGRAPHIC REDUCTION OF THE PHENYL-SUBSTITUTED ETHENES. I. RELATION OF POSTULATED MECHANISMS TO THEORETICAL BEHAVIOR PATTERNS, by Philomena G. Grodzka and Philip J. Elving. Rept. no. 64 on Contract AT(11-1)-70. Oct 61, 19p.

PB 157 339 $5.60

Notre Dame U., Ind.
A COMPARISON OF OXYGEN ON TUNGSTEN AND MOLYBDENUM BY FIELD ELECTRON MICROSCOPY, by D. R. Morgan and E. A. Coomes. Technical rept. on Contract Nonr-1623(01). 21 Sep 60, 52p. 12 refs. AD-248 983.

DESCRIPTORS: Adsorption, *Field emission, *Electron microscopy, Chemical reactions, *Oxygen, Oxides, Oxidation, Surfaces, *Molybdenum, *Metal films, *Tungsten, *Strontium compounds, Velocity.

A study was made of the behavior of O on W and Mo by field emission microscopy (FEM) from 1000 to 1900 degrees K. The changes in the FEM patterns were studied as a function of O coverage and as a function of time with activation temperature. A comparison was made of unsaturated O coverage on W and Mo. Activation energies were calculated for the patterns at the low, intermediate, and high activation temperature ranges. The most marked variation in emission patterns occurred in the low-temperature range. These changes were attributed to a rearrangement of the O-W and O-Mo complexes and to the possible formation of a different oxide. The patterns for saturated coverages apparently did not correspond to the unsaturated emitter. Stable states were obtained in the low and

intermediate temperature ranges. The results appeared to indicate that both oxidation and desorption occur at the temperatures used. Six oxides of Mo and 5 oxides of W were identified by x-ray analysis.

PB 157 411 $2.60

Noyes Chemical Lab., U. of Illinois, Urbana.
THE DIFFUSION OF HYDROGEN IN TRANSITION METALS AND THEIR HYDRIDES, by C. K. Coogan and H. S. Gutowsky. Technical rept. no. 35 on Contract Nonr-1834(13). 24 Oct 60, 25p. 22 refs. AD-249 455.

DESCRIPTORS: *Transition elements, Hydrides, *Diffusion, Hydrogen, *Titanium compounds, *Palladium compounds.

The diffusion of hydrogen in titanium hydride has been examined in terms of a simple electrostatic model. The energy of a hydrogen atom at various positions in the lattice has been calculated from the screened Coulombic potentials, neglecting repulsive terms of other origins. This gives the activation energy for hydrogen diffusion (E) as a function of the net electronic charge on the hydrogen atom. Agreement with the experimental results for E is obtained from a value for the electronic charge on the hydrogen which is consistent with other evidence. The model exhibits the distinct preference of the hydrogen atom for accommodation in tetrahedral rather than octahedral interstices. It predicts the decrease observed in E for titanium hydrides containing less than the stoichiometric proportion of hydrogen. The model also provides an explanation as to why hydrogen tends to distribute itself randomly and uniformly throughout the lattice rather than to form aggregates. Similar calculations for the palladium-hydrogen system give an activation energy for hydrogen diffusion of about 8 kcal/g atom for PdH(0.55) and about 3.4 kcal/g atom for almost pure Pd. (Author)

PB 159 093 $1.10

Stanford U. [Calif.]
ELECTROCHEMICAL STUDIES ON HYDRAZINE FORMATION IN LIQUID AMMONIA, by R. A. Ogg, Jr. Final rept. on Contract N123S-80063, Task 1. 27 June 52, 8p. 4 refs.

DESCRIPTORS: *Ammonia, *Liquefied gases, Gases, *Hydrazines, Synthesis, *Electrochemistry, Electrolysis.

From the standpoint of the practical considerations, these studies have the value of suggesting the extreme unlikelihood that the electrochemical methods in question may ever serve for the preparation of hydrazine. From the strictly scientific standpoint, the negative results reported suggest that the behaviour of NH_2 radicals combining at electrode surfaces is entirely different from that in homogeneous recombination.

PB 157 348 $4.60

Chicago U., Ill.
ESTIMATES OF VERTICAL MOTIONS AND MERIDIONAL HEAT EXCHANGE IN GULF-STREAM EDDIES, AND A COMPARISON WITH ATMOSPHERIC DISTURBANCES, by Chester W. Newton. Technical rept. no. 3 on Contract Nonr-2121(10) and National Science Foundation Grant NSF-G6353. Sep 60, 46p. 26 refs. AD-251 143.

DESCRIPTORS: *Heat transfer, *Gulf stream, *Ocean currents, Motion, Atmosphere, Turbulence, Oceanography, Turbulent flow,

On the basis of certain assumptions about the subsurface structure of the Gulf-Stream eddy Edgar (1950), computations are made of various properties of large-scale oceanic eddies, by the use of methods employed in the study of atmospheric disturbances. It was found that during the formation of Edgar the southward flux through its neck in upper levels exceeded its rate of areal expansion, the reverse being true in lower levels. This implies general subsiding motions, reaching probable maximum mean values of 30 x 1/1000 cm/sec at 600 meters depth. Descending motions were much stronger in the southern than in the northern part of the eddy. The heat exchange across the mean Gulf Stream, associated with the separation of one eddy from the main cold-water mass, is found to about 200-400 x 10 to the 18th. gm cal. Horizontal and vertical mass transports in the Gulf-Stream eddy, during the period of formation, are found to be comparable to that in a cold outbreak in the atmosphere. (Author)

RME-109(Rev.) $0.75

Grand Junction Operations Office, Colo.
URANIUM-VANADIUM DEPOSITS OF THE COTTONWOOD WASH MINING AREA, SAN JUAN COUNTY, UTAH, by R. K. Pitman. WITH A SECTION ON MINERALOGY, by E. B. Gross. Mar 58, 26p.

Climatology and Meteorology

PB 157 814 $2.60

Chicago U., Ill.
AN EXAMPLE OF STRONG DIABATIC COOLING OVER THE ROCKY MOUNTAINS, by Ernst Kleinschmidt. Rept. on Contract Nonr-2121(19). Sep 60, 21p. 2 refs. AD-250 394.

DESCRIPTORS: *Atmosphere, *Cooling, Cyclones, Anticyclones, *Meteorology, Humidity, Temperature, Mountains.

A case of strong diabatic cooling over the Rocky Mountains is described. It causes the formation of a strong anticyclone over, and the origin of a high-level cyclone east to the mountains. The rate of cooling is so strong that it can not be explained by the presently known theories. (Author)

PB 157 621 $5.60

Florida State U., Tallahassee.
CONCERNING THE FEASIBILITY OF COMPUTING THE FIELD OF PRESSURE-GEOPOTENTIAL FROM OBSERVED WINDS BY USE OF THE DIVERGENCE EQUATION, by Stanley L. Rosenthal. Technical rept. no. 15 on Contract Nonr-1600(00). 31 Oct 60, 52p. 9 refs. AD-249 147.

DESCRIPTORS: *Weather forecasting, *Wind, Barometric pressure, Meteorological charts, Numerical analysis, Map projection, Meteorological balloons.

The wind field at 500 mb, over the US, for a particular synoptic situation, is estimated by careful analysis of rawin and pilot-balloon reports. Wind-dependent terms in the divergence equation are calculated from these analysed wind fields. Several simplified versions of the steady-state divergence equation are solved as Poisson equations for the pressure-geopotential. The geopotentials so computed are in good agreement with the observed geopotentials provided that the vorticity and Jacobian terms are both included in the computation. Best results are obtained when the divergence-advection term is also included. (Author)

PB 157 350 $6.60

Wisconsin U., Madison.
COMPILATION OF FREEZING AND THAWING DATES FOR LAKES IN NORTH CENTRAL UNITED STATES AND CANADA, by Robert A. Ragotzkie. Technical rept. no. 3 on Contract Nonr-1202(07). Sep 60, 64p. 4 refs. AD-250 116.

DESCRIPTORS: *Lakes, Freezing, Melting, Tables, Time, Canada, Wisconsin

Frost Science

PB 158 586 $5.60

Washington U. [Seattle].
THE BLUE GLACIER PROJECT 1959 AND 1960, by E. Lachapelle. Final rept. on Contract Nonr-477(18). Dec 60, 59p. 13 refs. AD-251 836.

DESCRIPTORS: *Glaciers, Surface properties, Snow, Melting, Energy, Climatic factors, Ice charts, Thickness, Washington.

The Blue Glacier Project was initiated in 1957 for examining the mass and energy balance of a temperate, maritime, alpine glacier as a part of the US Northern Hemisphere program in Glaciology. The project was part of a dual program of comprehensive glacier studies, the other half being a study of a polar alpine glacier (the McCall Glacier, Alaska). (Author)

PB 158 587 $17.00

Washington U. [Seattle].
THEORY AND OBSERVATIONS OF THE DRIFT OF ICE STATION ALPHA, by Richard J. Reed and William J. Campbell. Final rept. [on Contract Nonr-477(23)]. Dec 60, 268p. 16 refs. AD-249 945.

DESCRIPTORS: *Ice, Drift, *Weather stations, Meteorological data, Fluid mechanics, *Ocean currents, Stresses, Numerical methods and procedures, Arctic regions, Motion.

The theory of ice drift is considered. Problems connected with the specification of the various forces acting on the ice-coriolis force, wind stress, water drag, and internal resistance - are discussed. A new formulation of the internal stress, which can be approximated by data taken from atmospheric pressure charts, is suggested. (Author)

Oceanography

PB 155 201 $2.60

David Taylor Model Basin, Washington, D. C.
"SPLASHNIK": THE DAVID TAYLOR MODEL BASIN DISPOSABLE WAVE BUOY, by Wilbur Marks and Robert Tuckerman. Dec 60, 27p. 6 refs. Rept. no. 1423; AD-252 554.

DESCRIPTORS: *Ocean waves, *Buoys, Tests, *Telemeter systems, Measurement, Accelerometers.

A disposable telemetering wave buoy is described. Its operating principles, based on measurement of the apparent vertical acceleration of surface water particles, are discussed. The method of reduction of acceleration records to wave height spectra is given. Experiments made in the model tank and at sea, for the purpose of comparing the SPLASHNIK with fairly reliable systems of wave measurement, are described in detail. The results are shown to indicate good agreement between the measurements of the SPLASHNIK and two other instruments. The SPLASHNIK is judged to be acceptable as a wave measurement device, within the scope of its intended use. Future plans for refining the system's accuracy and extending its potential to measurement of other variables are discussed. (Author)

PB 157 416 $1.60

Galveston Marine Lab., Texas A. and M. Coll.
SUBSURFACE ENVIRONMENTAL ELEMENTS AND THEIR POSSIBLE RELATIONSHIPS TO SURFACE "SLICKS", by Albert Collier and Frank Slowey. Interim rept. on Contract Nonr-2119(03). 21 Oct 60, 19p. 7 refs. AD-246 612.

DESCRIPTORS: *Aquatic animals, Surface properties, Surfaces, Fatty acids, *Surface tension, *Sea water, Plants, Microorganisms, Bacteria, Carbohydrates, Physical properties.

Surface slicks on the sea result from a combination of biological and physical factors. Other than man-made pollutants, the materials which alter the surface tension sufficiently to cause a slick are surface active organic compounds ultimately derived from living organisms. Physical forces cause the accumulation of these materials in molecular films of proper qualitative and quantitative characteristics for the appearance of slicks. The mechanisms bringing about the release of surface active compounds from the

organisms may be grouped as either biological or physical. The physical agents could be further subdivided into the purely mechanical stimuli (shearing by breaking waves, etc.) and the less obvious forces (sudden temperature or pressure changes, etc.) which shall be denoted for convenience as physical. The objectives of this work fall into two divisions: (1) to determine the fatty acid spectra characteristics of various plankton organisms and to study other surface active components appearing with them; and (2) to make an experimental study of the effects of mechanical and physical stimuli on the organisms and their role in the formation of surface slicks.

PB 158 672 $1.10

Oregon State Coll. School of Science, Corvallis.
PRESENT RESEARCH, FACILITIES AND STAFF, by June G. Pattullo. Progress rept. no. 1 on Contract Nonr-1286(02). Dec 60, 9p. 2 refs. Reference no. 60-3; AD-249 371.

DESCRIPTORS: *Oceanography, Scientific research, Scientific organizations, Test facilities, Oregon

PB 158 642 $7.60

Texas A. and M. Coll., College Station.
MODEL STUDY OF SURGE ACTION IN A PORT, by Basil W. Wilson. Rept. on Contract N7onr-48702. Dec 60, 75p. 66 refs. Technical rept. no. 24-(57); Reference no. 60-22T; AD-248 782.

DESCRIPTORS: Cable assemblies, *Harbors, Damage control, *Harbor models, Motion, Mooring, Tides, Ships, South Africa, Range.

This report includes:
Research and Model Studies on Range Action Table Ray Harbour, Cape Town, by Basil W. Wilson. 1959, pub. in The Civil Engineer in South Africa, June and July 59.

Table Bay Harbour, Cape Town, is shown to be afflicted by two forms of surging, one of which is responsible for ranging of moored ships, the other for a pumping action of the basins and attendant navigational hazards. The construction and operation of a distorted model of Table Bay and harbour to reproduce the phenomena are described. The model was proof tested in various ways and found reliable. Efforts to control the surging were directed chiefly to the Duncan Basin. Internal structures and re-positioning of the basin entrance failed to reduce the disturbances to harmless proportions. Suitable external structures of outer basin type, on the other hand, proved capable of inhibiting effects in the Duncan Basin. Success of the chain-system of basins is ascribed to its throttling effect on the long wave energy in the frequency range critical for moored ships. Measurements and theoretical considerations of ship motions and statistical analysis of rope breakages and damage all confirm that the critical period range for shipping is below 2 min and more particularly in the neighborhood of 1 min. (Author)

PB 158 627 $2.60

Woods Hole Oceanographic Institution, Mass.
TELEMETERING THERMOMETER, by Angelo J. Campanella. Technical rept. on Contract Nonr-2196(00). Dec 60, 29p. Reference no. 60-47; AD-248 694.

DESCRIPTORS: *Telemetering, Temperature, Measurement, *Thermometers, Thermistors, *Transducers, Electronic circuits, Buoys, *Oceanography, Oscillators, Water, Temperature sensitive elements, *Telemetering transmitters, *Telemetering receivers

A temperature transducer for temperature measurement at depth for a radio telemetering link from a drift buoy has been developed. The nominal design depth is 200 meters for the transducer. It has an accuracy of 0.1 degree C or better depending on radio link quality. The system is operational and is being tested at shallow depths. (Author)

Physics of the Atmosphere

PB 155 944 $8.10

Antenna Lab., Ohio State U. Research Foundation, Columbus.
TEMPERATURE MEASUREMENTS AT ALTITUDES ABOVE 120,000 FEET. Final engineering rept. 1 July 59-31 Aug 60, on Contract DA 36-039-sc-84516. 1 Sep 60, 81p. 59 refs. Rept. 973-3; AD-252 143.

DESCRIPTORS: *Atmosphere, High altitude, *Temperature, Measurement, Pressure, Falling bodies, Spheres, Ionosphere.

An analysis of specific methods for determining the temperature and/or scale height of the atmosphere above 120,000 ft is presented. These methods are discussed in four separate categories: direct temperature measurements; pressure gauge measurements; the falling sphere method; and kinetic temparatures in the ionosphere. Categorical as well as general conclusions and recommendations are presented. (Author)

HW-69292(Rev.) $0.50

Hanford Atomic Products Operation, Richland, Wash.
SOME MEASUREMENTS OF THE DEPOSITION OF MATTER AND ITS RELATION TO DIFFUSION FROM A CONTINUOUS POINT SOURCE IN A STABLE ATMOSPHERE, by C. L. Simpson. Rept. on AT(45-1)-1350. Apr 61, 22p.

AD-259 468 $5.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
FREE MOLECULAR HEAT TRANSFER IN THE IONOSPHERE, by L. M. Gilbert and S. M. Scala. 10 Mar 61, 51p. 35 refs. Technical Information Series R61SD076.

DESCRIPTORS: *Ionosphere, Kinetic theory, Energy, *Heat transfer, Gas flow, *Hypervelocity vehicles, Hypersonic flow, Molecular structure, *Ionization potentials, Surface temperatures, Superaerodynamics.

The potential energy stored in the ionosphere in terms of the atomic particles and ionized species is substantial, and the energy released in the recombination processes taking place at the surface of the vehicle can therefore contribute substantially to the overall heat transfer. In order to evaluate the importance of these chemical effects, the usual free molecular heat transfer and mass flux expressions are modified in this study to allow for a multi-component chemically reacting mixture of gases. These expressions include the effects which result from the recombination interactions at the solid-gas interface caused by the transport of atomic and ionized particles to the vehicle. Results of the numerical solutions are presented graphically as functions of the altitude and flight velocity. The magnitudes of the various modes of energy transferred to the vehicle are compared. In particular, it is shown that for many free molecular situations of interest (i.e., flight speeds which are equal or greater in magnitude than escape velocities), the kinetic terms in the transfer equations are the dominant ones. However, for certain attainable combinations of altitude and flight speed, the total energy transfer can exceed the available kinetic energy by a factor as large as five. (Author)

PB 156 223 $5.60

United Research, Inc., Cambridge, Mass.
TURBULENCE MEASUREMENTS AT HIGH ALTITUDES BY SECOND-DIFFERENCE INTERFEROMETRY. AN EXPERIMENTAL SYSTEM, by Dwight W. Batteau, Thomas E. Beling, and Allyn StC. Richardson. Quarterly rept. no. 1, 1 July-30 Sep 60, on Contract DA 36-039-sc-84963. 30 Sep 60, 52p. AD-250 298.

DESCRIPTORS: Turbulence, Measurement, High altitude, *Atmosphere, Interferometers, Digital computers.

Previous work, including the principle of second-difference interferometry is reviewed. Current work on the theoretical tasks, both basic and particularized for the present experimental system is presented. Methods of extracting pertinent target information from the received signals are discussed in terms of physical hardware required, some of which was built and tested. Recording of such information in a form accessible for computation of the target information required is considered. A possible system for digitalization and recording on magnetic tape is described in a form compatible for direct input to a digital computer. The experimental system being constructed is described in physical orientation relative to prevailing winds and air traffic laws, in disposition of principal components and controls, and in solution of electrical and mechanical problems encountered. (Author)

ENGINEERING

P3 154 823 $2 60

Aeronautical Structures Lab., Naval Air Material Center, Philadelphia, Pa.
THE EFFECT OF PRELOADING ON THE VARIABLE AMPLITUDE FATIGUE CHARACTERISTICS OF A SLAB HORIZONTAL TAIL FOR A TYPICAL FIGHTER AIRPLANE, by R. P. Swartz and M. S. Rosenfeld. Rept. on Proj. TED NAM RAAD-2123.3. 18 Jan 61, 22p. 3 refs. Rept. no. NAMATCEN-ASL-1023, part III; AD-250 865.

DESCRIPTORS: Jet fighters, Fighters, Jet planes, Fatigue (Mechanics), Structures, Tests, Failure (Mechanics), Countermeasures, *Stabilizers (Horizontal tail surface), Life expectancy.

Variable amplitude fatigue tests were performed on two groups of three specimens. Prior to the tests, a single preload of 65.3 percent of the actual static strength was applied to each specimen in the first group and a single preload of 73.8 percent of the actual static strength was applied to each specimen in the second group. The log mean lives of the two groups were compared with the log mean life obtained for a similar group of three specimens tested for the same spectrum without preloading. The comparisons indicated life increases of 16.5 percent and 101.7 percent for the first and second groups, respectively. (Author)

PB 155 091 $2.60

Illinois U., Urbana.
SURVEY OF LITERATURE IN CONNECTION WITH THE DYNAMIC BEARING CAPACITY OF SOILS, by Narbey Khachaturian. Rept. on Contract DA 22-079-eng-240. Oct 59, 27p. 115 refs. DASA-1161; AD-232 102.

DESCRIPTORS: *Soils, Bibliography, Mechanical properties, Tests, Physical properties, Loading, Blast, Underground explosions, Shock resistance.

PB 159 158 $9.60

St. Paul District, Corps of Engineers, Minn.
IDENTIFICATION AND EVALUATION OF ALASKAN VEGETATION FROM AIRPHOTOS WITH REFERENCE TO SOIL, MOISTURE AND PERMAFROST CONDITIONS, A PRELIMINARY PAPER, by E. G. Stoeckeler. Rept. on Investigation of Airfield Construction in Arctic and Subarctic Regions. June 48, 113p. 32 refs. TR-21.

DESCRIPTORS: *Alaska, *Aerial photographs, *Aerial photography, *Soils, *Moisture, *Permafrost, *Plants, Growth, *Engineering personnel, Rivers, Levees, Swamps, Trees, Growth, Identification, Ecology, Drainage, Biology

The purpose of this paper is to familiarize the airphoto interpreter with: (1) the basic natural influences which govern plant growth and distribution; (2) the value of vegetation as an indicator of soil texture, drainage, and permafrost conditions; and (3) the description of airphoto patterns of the different cover types occurring in the Permafrost Zone in Alaska. This paper is written expressly for engineers and soils men having a limited knowledge of the botanical sciences and is not intended to be an ecological treatise. (Author)

Chemical Engineering

ANL-6379 $3.50

Argonne National Lab., Ill.
CHEMICAL ENGINEERING DIVISION. Summary rept. Apr-June 61, on Contract W-31-109-eng-38. Oct 61, 255p.

TID-3567 $0.50

Atomic Energy Commission. Division of Technical Information Extension, Oak Ridge, Tenn.
SALINE WATER CONVERSION, comp. by Henry D. Raleigh. A literature search. Oct 61, 29p. 372 refs.

NAA-SR-6386 $0.50

Atomics International, Canoga Park, Calif.
REMOVAL OF CARBON FROM LIQUID SODIUM SYSTEMS, by W. J. Anderson. Rept. on Contract AT(11-1)-GEN-8. 24p.

ORNL-3194 $0.50

Oak Ridge National Lab., Tenn.
EXTRACTION OF NEPTUNIUM FROM ACIDIC SOLUTIONS BY ORGANIC NITROGEN AND PHOSPHORUS COMPOUNDS, by Boyd Weaver. Rept. on Contract W-7405-eng-26. 20p.

IDO-16732 $0.50

Phillips Petroleum Co., Idaho Falls.
THE GAS-SOLID CHROMATOGRAPHIC SEPARATION OF POLYPHENYLS ON LITHIUM CHLORIDE - FIREBRICK, by A. J. Moffat and P. W. Solomon. Rept. on Contract AT(10-1)-1080. Nov 61, 14p.

Electrical and Electronic Engineering

PB 154 534 $3.60

Admiral Corp., Chicago, Ill.
DEVELOPMENT AND FABRICATION OF HOMING LOOP ANTENNA AT-784/PRC (SERVICE TEST MODEL), by A. Anton. Final rept. for 1 Apr-31 Oct 59 on Contract DA 36-039-sc-75024. Feb 60, 32p; AD-217 747.

DESCRIPTORS: *Loop antennas, Design, Production, Model tests, Radio signals, *Homing devices, Direction finding, Radio receivers, Electrical equipment, Ferrites, *Radio homing, Specifications, Wiring diagrams, Antennas.

A new 50-ohm constant impedance attenuator network was designed to improve the bearing accuracy and reduce the probability of confusion due to change of bearing with change of tuning range. A one-turn secondary was selected for proper matching to the loop. Tests indicated that a substantial improvement was achieved. Stray pickup, which also contributed to bearing inaccuracy, was effectively eliminated by proper use of a triaxial cable in the output connection and by the compact construction of the attenuator network and switch. Mechanical changes were made to improve the watertightness of the unit, mechanical/physical properties (bounce test), and carrying bag. (Author)

PB 157 976 $1.60

Airborne Instruments Lab., Deer Park, N. Y.
DEVELOPMENT OF C-BAND REACTANCE AMPLIFIER, by J. C. Greene, S. Okwit, and J. J. Whelehan. Quarterly progress rept. no. 1, 14 June-15 Sep 60, on Contract DA 36-039-sc-85359. 15 Oct 60, 14p. 3 refs. Rept. no. 8412-I-1; AD-247 079.

DESCRIPTORS: *Amplifiers, Design, C band, Gallium compounds, Arsenides, *Diodes, Microwave amplifiers, Transmission lines, Noise (Radio).

Research is concerned with the design, development, and fabrication of C-band reactance amplifiers that meet the following design goals: (1) center frequency of 5280 mc, (2) bandwidth 60 mc, (3) power gain greater than 20 db, and (4) noise figure less than 4 db when operated at room temperature. A general study of over-all system requirements was made to determine acceptable limits on amplifier noise figure and power gain. Texas Instruments and Bell Telephone Laboratories gallium arsenide diodes were evaluated, and experimental amplifiers were designed to determine the performance of these diodes. Preliminary results indicate that an amplifier noise figure of about 2.7 db can be obtained at room temperature; this is consistent with a 60-mc bandwidth and sufficient gain to ensure an over-all system noise figure of less than 4 db. (Author)

PB 157 977 $1.60

Airborne Instruments Lab., Deer Park, N. Y.
DEVELOPMENT OF C-BAND REACTANCE AMPLIFIER, by J. C. Greene, J. Kliphuis and J. J. Whelehan. Quarterly progress rept. no. 2, 16 Sep-15 Dec 60, on Contract DA 36-039-sc-85359. 15 Jan 61, 15p. 2 refs. Rept. no. 8412-I-2; AD-251 490.

DESCRIPTORS: *Amplifiers, Design, C-band, *Diodes, Microwave amplifiers, Arsenides, Noise (Radio), Gallium compounds.

Three different types of varactor diodes were evaluated, and it was determined that only the silicon pill diode and the gallium arsenide point-contact diode are satisfactory for this application. Either of these diodes will meet the specified performance requirements at room temperature. However, only the point-contact diode will provide improved noise figure performance if it is refrigerated to 77 degrees K. (Author)

PB 157 296 $2.60

Bell Telephone Labs., North Andover, Mass.
QUARTZ CRYSTAL CONTROLLED OSCILLATORS, by W. L. Smith and W. J. Spencer. Interim rept. no. 1, 1 Oct-31 Dec 60, on Contract DA 36-039-sc-85373. 10 Jan 61, 24p. 10 refs. Rept. no. 25335; AD-253 032.

DESCRIPTORS: *Quartz crystals, *Crystal ovens, *Crystal oscillators, *Feedback oscillators, Oscillators, Vibration, Oscillator circuits, Stability, Temperature, Radiofrequency, Design, Satellite vehicles, Guided missiles, Aging, Crystals.

A preliminary investigation has been made of means to improve the performance of the 5-mc AT-cut precision quartz crystal units during severe mechanical vibration. Through the use of a more rigid mount consisting of thicker and shorten supporting ribbons, it has been found possible to construct a crystal unit which will withstand 6g vibration up to 2000 cps without showing frequency deviations greater than 1 part per 10 to the 8th power. Equipment is being assembled to facilitate studies of the effects of improved cleaning and evacuation techniques on the long time frequency aging of precision crystal units. Precision crystal ovens and oscillator circuits are being fabricated to permit careful measurement of the frequency aging of experimental crystal units. The thermal stability of crystal ovens maintained by proportional control circuits of different types is being determined by means of a specially fabricated 5-degree Y-cut crystal unit, used as a highly sensitive thermometer. Preliminary tests indicate that considerable improvement in oven performance should be possible by using feedback-stabilized control circuits. (Author)

PB 156 550 $8.10

Bell Telephone Labs., Inc., Whippany, N. J.
ENGINEERING SERVICES ON TRANSISTORS.
Interim technical rept. no. 2, 1 July-30 Sep 60, on Contract DA 36-039-sc-85352. 30 Nov 60, 82p. 25 refs. AD-252 287.

DESCRIPTORS: *Transistors, Reliability, Oxidation, Circuits, Silicon, *Semiconductors, Crystals, Germanium, *Feedback amplifiers, *Diodes, Gallium compounds, Arsenides, *Triodes, Electron tubes, Solid state physics, *Power amplifiers, Amplifiers, Microwave equipment.

Contents:
Transistor reliability
- Effect of crystal orientation on oxidation rates of silicon in high-pressure steam
- A method for the rapid evaluation of reliability of semiconductor devices

New and improved transmission-type transistors
- Status of the M2107 transistor
- The status of the 1w, 1000mc transistor
- Single-stage wideband feedback amplifiers employing the M2107 microwave germanium transistor

Functional devices and integrated circuits
- Gallium arsenide Esaki diodes
- A method for the measure of capacitance of Esaki diodes
- Temperature dependence of the peak current in Esaki diodes
- Status of the integrated circuit program
- Integrated multiple diodes
- Turn-off gain in P-N-P-N triodes

(See also PB 155 973)

PB 157 596 $4.60

Bell Telephone Labs., Inc., Whippany, N. J.
ENGINEERING SERVICES ON TRANSISTORS, by R. J. Archer, M. M. Atalla and others. Interim technical rept. no. 3, 1 Oct-31 Dec 60, on Contract DA 36-039-sc-85352. 28 Feb 61, 47p. 17 refs. AD-253 243.

DESCRIPTORS: *Transistors, Reliability, Germanium, Silicon compounds, Dioxides, Silicon, Aging, Microwave equipment, Design, Semiconductors, Manufacturing methods, Encapsulation, Diodes.

Contents:
Transistor reliability
- Ellipsometer parameters and other properties of various silica films on silicon
- Step-stress aging of diffused germanium transistors, A process study

New and improved transmission type transistors
- Status of the coaxially encapsulated microwave transistor
- Status of the one-watt 1000-mc transistor

Functional devices and integrated circuits
- Status report on integrated circuits and functional devices
- Status of the multiple diode program

(See also PB 155 973)

PB 156 999 $1.60

Bell Telephone Labs., Whippany, N. J.
FUNDAMENTAL STUDIES OF THE PROPERTIES OF NATURAL AND SYNTHETIC QUARTZ CRYSTALS, by J. C. King. Interim rept. no. 2, 1 Oct-31 Dec 60, on Contract DA 36-039-sc-85364. 23 Feb 61, 17p. 8 refs. Rept. no. 25334-A; AD-253 033.

DESCRIPTORS: *Quartz crystals, Growth, Internal friction, *Quartz resonators, Silver, Conductivity, Electric fields, Diffusion, Electrolysis, Physical properties, Acoustics, Crystal structure.

A study was made of electric field-induced axial diffusion of silver in various samples of natural and synthetic quartz. The rate of diffusion is considerable in synthetic growth on natural seed faces and in material grown slowly in the direction of the Z-axis. However, the migration of silver in fast Z-growth material or adjacent X-growth quartz cannot be detected. From this body of data there emerges a notable degree of correlation between the ability of a given quartz to allow axial migration of silver, and its acoustic loss at room temperature for thickness shear vibration. Both these phenomena are believed to be affected by macroscopic imperfection, appearing as distinct crystallites in some samples of quartz. These discrete crystals can be physically defined in the material through electrolysis, using a silver anode. The formation of this unique imperfection appears to be associated with fast growth on the basal cut. (Author)

PB 158 721 $4.60

Bell Telephone Labs., Inc., Whippany, N. J.
SOLID-STATE MASER RESEARCH, by E. D. Reed. Quarterly rept. no. 2, 20 Sep-20 Dec 60, on Contract DA 36-039-sc-85357. 20 Dec 60, 43p. 15 refs. AD-251 877.

DESCRIPTORS: *Microwave amplifiers, L-band, Amplifiers, Chromium, Ruby, Gadolinium, Calcium compounds, Tungstates, Crystals, Single crystals, Lattices, Additives, Spin, Mathematical analysis, Maser.

Contents:
Optimization of chromium concentration in ruby, L-band
Mathematical appendix
Gadolinium in calcium tungstate as a maser material
Stagger tuning of traveling-wave masers
Harmonic pumping of spin systems
(See also PB 158 267)

PB 155 844 $9.10

Cornell U. School of Electrical Engineering, Ithaca, N. Y.
INVESTIGATION OF NOISE GENERATION IN ELECTRICALLY TUNABLE MICROWAVE OSCILLATORS, by G. C. Dalman and P. R. McIsaac. Final rept. 22 June 59-23 Aug 60, on Contract DA 36-039-sc-84524. [1960] 110p. 9 refs. Research rept. EE 473; AD-249 809.

DESCRIPTORS: *Microwave oscillators, *Backward wave oscillators, Signal-to-noise ratio, *Noise (Radio) Electron tubes, Helixes, Mathematical analysis, *Electrical networks, Analysis, *Electron tube oscillators

A simple local-oscillator model of the backward-wave oscillator is proposed to establish the basic tube design parameters required of a low-noise backward-wave oscillator. Preliminary measurements were made of the S/N and noise spectrum of a Raytheon QK610 backward-wave oscillator. The thin tape helix was studied in detail. Several of the helix parameters that are important for the operation of backward-wave oscillators were calculated and one is presented. A description of the output spectrum of an oscillator excited by a small external signal is made. The principle features of this interaction are presented and are demonstrated experimentally. Here, Wiener's work on optimum linear electric networks is extended to include networks that contain noisy active elements. The difficulties involved are discussed, and a mathematical formulation is presented for the special case of cascaded linear active networks. The effects of mutual dependence between noise sources are noted and optimum (in the Wiener sense) system functions are derived. (Author)

PB 156 902 $1.60

David Sarnoff Research Center, Princeton, N. J.
MOLECULAR AMPLIFIERS AND GENERATORS, by H. J. Gerritsen. Quarterly rept. no. 1, 1 Sep-30 Nov 60, on Contract DA 36-039-sc-87386. 29 Dec 60, 17p. AD-253 182.

DESCRIPTORS: *Microwave amplifiers, Iron, Amplifiers, Generators, Microwave equipment, Microwaves, Relaxation time, Ions, Vanadium, Chromium, Measurement, Temperature, Oxides, Titanium compounds, Resonance absorption, X-band, Lattices, Dielectric properties, Paramagnetic resonance, *Paramagnetic crystals, Ruby, *Radiofrequency generators, Design, *Microwave oscillators, Maser.

Spin lattice relaxation times of iron 3+, chromium 3+ vanadium 4+ in rutile were measured at different temperatures. The vanadium 4+ ion has a very short relaxation time at 77°K and higher. The traveling wave chromium rutile maser was cold tested. Experimental work on interaction between heat flow and paramagnetic ions has started. (Author)

PB 155 721 $9.10

David Taylor Model Basin, Washington, D. C.
A RADIO CONTROL AND POWERING SYSTEM FOR FREE-RUNNING MODELS OF SURFACE SHIPS, by C. W. Hoffman. Feb 60, 102p. 6 refs. Rept. 1359; AD-233 798.

DESCRIPTORS: *Ship models, Propulsion, Control systems, Radio equipment, *Remote control systems, Telemeter systems, Power supplies, Storage batteries.

This report describes a radio-control system for free-running models of surface ships. The system is designed for use in models ranging from approximately 15 to 30 feet in length and is arranged so that it may be used with single or multiscrew propulsion systems. A proportional rudder-control channel and two proportional propulsion-control channels are provided. Rudder position, rudder running time, and propulsion shaft rpm are indicated on the console to guide the operator in controlling the model. The system is powered by long-life rechargeable nickel-cadmium batteries. This report includes a brief review of the engineering study, and describes the complete system. Installation, operation and maintenance instructions, with photographs and schematic diagrams, are included. (Author)

PB 156 637 $3.60

Delta-f, Inc., Geneva, Ill.
DEVELOPMENT OF QUARTZ CRYSTAL OSCILLATOR FOR COMMUNICATIONS SATELLITES, by H. E. Gruen and D. W. Scarborough, Jr. Quarterly rept. no. 1, 15 Oct 60-15 Jan 61, on Contract DA 36-039-sc-87366. [1961] 31p. ARPA Order no. 54-60; AD-253 262.

DESCRIPTORS: *Crystal oscillators, Quartz crystals, Oscillator circuits, Very high frequency, *Satellite vehicles, Communication equipment, Radio transmitters, Transistors, Design, Extraterrestrial radio waves, Temperature control, Test equipment, Ovens.

The results of an investigation to determine the most promising oscillator configuration and crystal type for use in a 100 mc Satellite Oscillator are reported. Included are measured crystal parameters, and information on test equipment used. The oscillator circuit chosen is the transistorized equivalent of the grounded grid vacuum tube circuit. The crystal is operated at series resonance with feedback from the collector tuned circuit to the emitter through the crystal. Included are tuning effects and power outputs of the oscillator circuit. Power levels obtained are in the order of 2 milliwatts with crystal drive levels in the range of 1/2 to 2 milliwatts. Also reported is preliminary design data of the proportional oven control circuitry. A circuit utilizing a two stage a-c sensing and control circuit to drive a d-c oven heater is described. Problems encountered with sensing control placement are discussed. (Author)

PB 154 997 $5.60

Electronic Defense Labs., Mountain View, Calif.
DESIGN OF FILTER-TYPE WIDEBAND PARAMETRIC DIODE AMPLIFIERS, by Alex Mayer and Rowena Koch Rept. on Contract DA 36-039-sc-85402. 14 Dec 60, 51p. 2 refs. Technical memo. no. EDL-M328; AD-250 773.

DESCRIPTORS: *Microwave amplifiers, *Diodes, Electron tubes, Broadband, Design, Amplifiers, L band, S band, Mathematical analysis, Band-pass filters,

Design of wide band filter-type parametric amplifiers are given in detail for mid-band frequencies of 1 and 2.8 kmc. For comparison, the designs are all based on one particular varactor diode. Parasitic diode inductances were specifically taken into account. With two- and three- section filter designs, bandwidths of 5 to 17% were achieved. Large variations in gain across the passband initially obtained upon direct application of the design procedure, could be confined to about 3 db by detuning the resonator section in fairly simple ways. Gain-frequency curves, lumped-element networks, and distributed-element networks comprise a small practical catalog of the gain-frequency potentialities of L- and S-band amplifiers designed by this procedure. (Author)

PB 158 584 $3.60

Electronics Research Lab., U. of California, Berkeley.
DESIGN THEORY OF OPTIMUM NEGATIVE-RESISTANCE AMPLIFIERS, by E. S. Kuh and J. D. Patterson. Rept. on Contract Nonr-222(74). 6 Dec 60, 35p. 11 refs. Rept. no. 118; IER Series no. 60, issue no. 331; AD-253 241.

DESCRIPTORS: *Negative resistance circuits, *Amplifiers, Synthesis, Theory, *Electronic circuits, Electrical networks, Noise (Radio), Design, Circuits.

A general amplifier was considered which was obtained by imbedding a linear 1-port device in an arbitrary lossless reciprocal 3-port. The active device is assumed to have a representation of a negative conductance in parallel with a parasitic capacitance. A synthesis method to approach the optimum situation is presented. Other amplifier configurations are considered. In each case, the optimum gain-bandwidth formula, synthesis procedure and some useful design curves are given. (Author)

PB 158 585 $6.60

Electronics Research Lab., U. of California, Berkeley.
EVALUATION OF FEEDBACK AMPLIFIER DESIGN TECHNIQUES, by E. W. Pullen. Rept. on Contract Nonr-222(74). 20 Dec 60, 63p. 10 refs. Rept. no. 119; IER Series no. 60, issue no. 337; AD-254 235.

DESCRIPTORS: *Feedback amplifiers, Design, Amplifiers, Tests, Transistors, Analysis, Radio-frequency amplifiers, Stability, Effectiveness.

An investigation was performed to determine which of two basic feedback-amplifier design procedures, the Bode method or the root-locus technique, would result in the better amplifier in terms of the amplifier's gain, bandwidth and desensitivity. Five amplifiers were considered, two using the Bode procedure and three using the root-locus techniques. Each represented a prominent variation within the Bode or root-locus method. The modifications were performed to give a "best-versus-best" comparison of the design methods. To obtain an equitable comparison the same requirements of over-all gain and bandwidth were applied in each design, and the same transistors and transistor model were used for all calculations. In each case the amplifier was designed and constructed, and its performance was evaluated. The results of the experimental work show that the best amplifiers designed using the root-locus technique give a better performance than the best amplifier designed by the Bode method. Qualitatively as well as quantitatively, the root locus produced the better amplifier because of the versatility of the design procedure with respect to the various types of requirements it can accommodate. (Author)

PB 156 658 $3.60

Engelhard Industries, Inc., Newark, N. J.
FUEL CELL CATALYSTS, by Anna P. Hauel. Quarterly rept. no. 1, 1 July-30 Sep 60, on Contract DA 36-039-sc-85043. 30 Sep 60, 36p. 10 refs. AD-254 010.

DESCRIPTORS: *Catalysts, *Power supplies, *Fuel cells, *Electrodes, Hydrogen, Acids, Oxygen, Oxygen electrodes, Titanium, Metals, Materials, Electrolytes, Hydrogen compounds, Peroxides, Decomposition, Organic compounds, Electric potential, Oxidation, Sulfuric acid, Palladium catalysts, Platinum, Electrochemistry

Catalysts have been investigated consisting of a precious metal or of binary combinations of precious metals deposited on carriers. Measurements carried out on the rate of the catalytic decomposition of aqueous solution of hydrogen peroxide on the one side and of the cathode potentials obtained in 5% sulfuric acid with the same precious metals catalysts on the other side showed no simple relationship between decomposition rates and cathode potentials. Observed oxygen potentials may be determined by the stationary hydrogen peroxide concentration which in turn is given by its decomposition rate. The stability of hydrogen peroxide being greater in acid medium than in alkaline medium, the assumption had been made that catalysts efficient for hydrogen peroxide decomposition in acid medium might be suitable components for oxygen electrodes. This assumption is not supported - though not invalidate - by the measurements given in this report. (Author)

PB 156 659 $4.60

Engelhard Industries, Inc., Newark, N. J.
FUEL CELL CATALYSTS, by Anna P. Hauel. Quarterly rept. no. 2, 1 Oct-31 Dec 60, on Contract DA 36-039-sc-85043. 31 Dec 60, 46p. AD-254 011.

DESCRIPTORS: *Fuel cells, *Catalysts, Fuels, *Electrodes, Organic compounds, Liquids, Electrochemistry, Electric potential, Acids, Measurement, Oxygen electrodes, Oxidation, Platinum, Metals, Polarization, Cathodes, Palladium catalysis, Sulfuric acid, *Power supplies.

A number of precious metals and combinations of precious metals deposited on carbon powder have been examined as catalysts for the oxygen electrode in sulfuric acid. Platinum on carbon appears to be the most active catalyst, the efficiency increasing with increasing platinum content. Optimum performance was obtained with a catalyst consisting of 30% platinum on carbon which is superior to unsupported platinum black. Electrolytes in the acid to neutral range have been investigated as media for the oxygen electrode catalyst; in general strong acid media appear preferable. Certain sources of error have become evident in employing sine wave pulse generators for elimination of ohmic polarization and in employing half cells for evaluating electrode performance in ion exchange membrane cells. (Author) (See also PB 156 658)

PB 155 329-1 $12.50

General Electric Co., Schenectady, N. Y.
DEVELOPMENT OF SUPERPOWER THYRATRONS, by J. E. Dillon. Final rept. Vol. I. 25 May 56-15 Feb 59 on Contract DA 36-039-sc-71230. [1959] 177p; AD-226 661.

DESCRIPTORS: *Thyratrons, Design, Electron tubes, Radar, Pulse modulation, Switching circuits, Switches, Production, Electronic equipment, Hydrogen.

Development is described of a liquid-cooled, metal-ceramic, superpower hydrogen thyratron rated 48 megawatts peak power and 44 kilowatts average power. Program included investigation and evaluation of envelope design, voltage gradient grids, grid baffling, reservoir voltage range, anode cooling, cathodes and recovery strength. Performance and life test data are tabulated and plotted for many sample tubes. Work performed represents Phase I of a three-phase program for development of superpower thyratrons for radar pulse modulator switching service. Over-all program objectives are specified in Signal Corps Technical Requirements SCL-5181 dated 12 September 1955.

PB 156 561 $5.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
ELECTRONIC EQUIPMENT INTERFERENCE CHARACTERISTICS: COMMUNICATIONS TYPE, by C. E. Blakely, J. G. Holey and others. Quarterly rept. no. 1, 1 Nov 60-15 Feb 61, on Contract DA 36-039-sc-87183, continuation of Contract DA 36-039-sc-74855. [1961] 51p. 82 refs. Rept. no. 15; AD-254 699.

DESCRIPTORS: Military communications, *Pulse communication systems, Matrix algebra, Communication systems, Mathematical prediction, Reduction, *Radio interference, Interference, Test methods.

Research is concerned with the preparation of a catalogue listing the technical and tactical characteristics of all U.S. Army non-radar type electronic equipments, in particular, the radio interference producing and susceptibility characteristics. A comprehensive investigation is being conducted to determine the characteristics of U.S. Army communications equipment deemed necessary for the prediction and minimizing of radio interference with emphasis on pulse communications type equipments. A discussion of the philosophy of testing communications equipments is presented. A tentative list of tests that may be used to evaluate pulse equipments is presented and some of the receiver tests discussed. The matrix constructor program was completed and is being checked out. The basic interference list generators were modified so as to be compatible with the constructor program. The general characteristics of the matrix constructor program are discussed. The notion of a basic communication network is presented and a procedure advanced for processing a mutual interference matrix to obtain all basic communication networks. The mechanization of the procedure is explained by means of a flow diagram. (Author)

PB 155 743 $2.60

Gulton Industries, Inc., Metuchen, N. J.
THE DETERMINATION OF THE ACCURACY AND RELIABILITY OF THE VITRO TESTER AND THE OPTIMUM PROCEDURE FOR ITS USE, by Terence J. McGurn and Harvey N. Seiger. Quarterly progress rept. no. 1, 1 July-30 Sep 60, on Evaluation of Nickel-Cadmium Battery Testers, Contract DA 36-039-sc-85066. 30 Sep 60, 26p. AD-250 491.

DESCRIPTORS: *Alkaline cells, Test equipment, Effectiveness, Nickel, Cadmium.

Vitro Nickel-Cadmium Battery Tester No. 3 and various nickel-cadmium cells and batteries were received for evaluation. The cells (BB 403/U and BB 412/U) and batteries (BB 401/U and BB 412/U) were cycled to obtain their actual capacities. Phase A, the determination of optimum pulse rates for use of the tester presented a major difficulty. The tester, since it is designed to indicate the state of charge of 24 volt batteries, is not sensitive enough to give any indication of state of charge for individual cells. For Phase B, cells were charged and put on 90 and 180 day shelf stands at 0 F and 80 F. For Phase C, cycling equipment was designed and is being fabricated. (Author)

PB 155 946 $5.60

Gulton Industries, Inc., Metuchen, N. J.
THE DETERMINATION OF THE ACCURACY AND RELIABILITY OF THE VITRO TESTER AND THE OPTIMUM PROCEDURE FOR ITS USE, by H. Thomas Staub and Harvey N. Seiger. Quarterly progress rept. no. 2, 30 Sep-30 Dec 60, on Evaluation of Nickel-Cadmium Battery Testers, Contract DA 36-039-sc-85066. 30 Dec 60, 57p. AD-253 390.

DESCRIPTORS: *Alkaline cells, Test equipment, Tests, Effectiveness, Nickel, Cadmium.

The cells and batteries were conditioned as required to fulfill the need of this program. Modifications of the testers are being made to permit single cells and 5 cell batteries as well as 24 cell batteries to be tested. Partial evaluation of the tester with the BB401/U batteries was made. Batteries and cells

assigned to Phase B were rescheduled to meet the requirements of the contract. The cycling equipment for use in Phase C was modified to allow more space utilization in the laboratory. (Author) (See also PB 155 743)

PB 156 664 $5.60

Gulton Industries, Inc., Metuchen, N. J.
THE TESTING OF HERMETIC SEALS AND SEPARATORS, POSITIVE PLATE STUDIES, AND INVESTIGATIONS ON THE UNIFORMITY OF SEALED NICKEL-CADMIUM CELLS, by H. N. Seiger. Quarterly progress rept. no. 2, 1 Oct-31 Dec 60, on Investigations Leading to the Development of Improved Sealed Nickel-Cadmium Batteries, Contract DA 36-039-sc-85390. [1961] 55p. 9 refs. AD-254 020.

DESCRIPTORS: *Alkaline cells, Test methods, *Seals *Battery separators, Electrodes, Ceramic materials, Metal seals, Design, *Anodes (Electrolytic cells), *Storage batteries, Nickel, Cadmium.

Separators were tested after storage at -40°F and also at 125°F for chemical resistance, dimensional stability and electrical resistance. It was found that the voltage stabilizes more rapidly than the pressure during overcharge of sealed cells. During discharge the pressure in a cell decays more rapidly than it would on open circuit.

TID-13949 $4.60

Laboratories for Applied Sciences, U. of Chicago, Ill.
THE CHANNELED IMAGE INTENSIFIER. Final rept. Mar 60-Aug 61, on Contract AT(11-1)-647. 49p. LAS-TR-P150-13.

UCRL-9816 $0.50

Lawrence Radiation Lab., U. of California, Berkeley.
MODEL VI LINEAR AMPLIFIER SYSTEM AND PREAMPLIFIER, by William W. Goldsworthy. Rept. on Contract W-7405-eng-48. Aug 61, 18p.

AD-258 424 repriced $2.25

Lockheed Aircraft Corp., Sunnyvale, Calif.
ELECTRICAL CONTACTS IN SPACE ENVIRONMENT. AN ANNOTATED BIBLIOGRAPHY, by George E. Owens. May 61, 89p. 169 refs. Special Bibliography SB-61-23; 3-77-61-1.

DESCRIPTORS: *Bibliography, *Electrical equipment, Electric connectors, *Sliding contacts, *Space environmental conditions, *Electric switches, Ultraviolet radiation, Low temperature research, Radiation damage, Materials.

A bibliography is presented which is the result of a survey of recent literature pertaining to electrical contacts in a space environment. It supports a laboratory investigation into the effects of strong ultraviolet radiation, hard vacuum (10 to the -8th power mm Hg or less), and low temperature (-50 to +200FF) upon moving electrical contacts operating at currents in the milliampere-microampere range and at contact potentials up to a few millivolts. The bibliography includes references to work antecedent to the laboratory investigation, even though such work may not have been carried out within the specified range of conditions. The 69 references are arranged alphabetically by personal authors in 3 categories; (1) books, (2) reports, and (3) journal articles. An index of secondary personal authors and corporate sources is provided, in addition to a subject index. (Author)

PB 157 590 $10.50

Melabs, Palo Alto, Calif.
INVESTIGATION OF MICROWAVE NON-LINEAR EFFECTS UTILIZING FERROMAGNETIC MATERIALS, by Roy W. Roberts. Final rept. 23 Apr 57-31 Oct 60, on Contract DA 36-039-sc-73278. 1 Nov 60. 135p. 31 refs. AD-253 847.

DESCRIPTORS: *Ferromagnetic materials, *Frequency multipliers, Ferrites, *Microwave amplifiers, Mathematical analysis, Design, Electromagnetic properties, Single crystals, Microwave equipment, Crystal detectors, Calorimeters, Theory, Radiofrequency power.

A program is presented of investigation of non-linear effects in ferrites which consists of two tasks, one on ferrite parametric amplification and one on ferrite harmonic generation. For each task a detailed theory is developed and evaluated. Experimental techniques are described and experimental results presented. As much as 50 watts peak power of 2 mm radiation was produced and the possibilities for higher powers are very good. A 21 kmc ferrite parametric amplifier is described. This amplifier is pumped at 35 kmc and has given gains as high as 50 db and useable gain with pump powers as low as 4 watts. In addition to these tasks, techniques for growing large single crystal yttrium-iron garnets are described. Also described are several microwave components developed for use at 2 mm, including a crystal detector and calorimeter. The calorimeter has a sensitivity of 100 microwatts. (Author) (See also PB 154 192)

PB 155 024 $2.60

Melabs, Inc., Palo Alto, Calif.
MILLIMETER FERRITE DUPLEXING DEVICES, by R.A. Henschke. Quarterly progress rept. no. 1, 15 June-14 Sep 60, on Contract DA 36-039-sc-85351. [1960] 25p. 5 refs. AD-247 442.

DESCRIPTORS: *Transmission lines, *Switching circuits, Switches, Ferrites, *Microwave equipment, Transducers, Attenuation, Radar duplexers, Design, Radiofrequency attenuators, Waveguides, Circuits.

Efforts concern the design, construction and evaluation of a millimeter ferrite switch, isolator, pulsed attenuator and circulator for operation as a duplexing unit. An experimental, orthogonal-mode-transducer was designed for use with a ferrite polarization rotator. Measurements were carried out on a fixture designed for use with RG-91/U waveguide over the

frequency band from 16-17.3 kmc. An attempt will be made to broadband a resonance isolator by cascading ferrite materials of different anisotropy constant in a uniform magnetizing field. Ferrite test sections are being fabricated. A fixture for testing the rotation of polarization from experimental ferrite rods was completed. Effort was concentrated on obtaining or producing a nickel-zinc ferrite material of high saturation magnetization for use in this device. A Y-circulator is under investigation as a possible alternative design approach. Experimental data is given for the latter design. (Author)

PB 156 666 $2.60

Microwave Associates, Inc., Burlington, Mass.
INVESTIGATION OF DUPLEXING TECHNIQUES AT HIGH DUTY CYCLE CONDITIONS, by Richard Damon and Harold S. Maddix. Quarterly progress rept. no. 1, 1 Nov-31 Jan 60, on Contract DA 36-039-sc-87385. [1961] 24p. AD-254 332.

DESCRIPTORS: *Radar duplexers, Ferrites, *Microwave equipment, *Electronic switches, Quartz, Waveguides, Gas discharges, Design, Semiconductors, Quartz crystals, X-band.

Experimental results are presented for a pre-TR device utilizing quartz capsules filled with different gases. Significant arc loss differences are seen between capsules with different electrical lengths. The feasibility of using gadolinium iron garnet in a high duty circulator is discussed. The problems of using pill varactors at X band frequencies are outlined. (Author)

TID-13452 $1.60

New Mexico U. Engineering Experiment Station, Albuquerque.
OUTPUT RESISTANCE OF THE HALL GENERATOR, by Bill J. Harper. July 61, 114p. SCDC-2390.

PB 155 602 $4.60

Norwegian Defense Research Establishment.
LARGE-SIGNAL ANALYSIS OF MONOTRON OSCILLATORS WITH SINUSOIDAL INTERACTION FIELD, by Tore Wessel-Berg. Technical note no. 3 on Contract AF 61(052)264. Dec 60, 45p. 7 refs. RADC-TN-61-67; AD-254 078.

DESCRIPTORS: Norway, *Radiofrequency oscillators, Oscillators, Analysis, Electric fields, *Cavity resonators, Design, Electron beams, Voltage, Hysteresis, Distortion, Admittance, Radio fields, *Electron tubes, Signal generators, Waveform generators, Theory, Mathematical analysis, *Radio signals.

A large-signal kinematic analysis of monotron oscillators with sinusoidal interaction fields is presented. The electronic conductance and susceptance as a function of the RF amplitude and the dc beam velocity are shown in a number of graphs for mode numbers n up to 6 (number of half wavelengths). A maximum conversion efficiency of 33% is obtained for n equal to 5. For larger n the conversion efficiency drops due to overbunching in the beam. For smaller n the efficiency drops due to the occurrence of reflections of electrons in the interaction gap. The oscillator can be electronically tuned by pulling the resonant frequency of the cavity through the reactive component of the beam current which can be varied by means of the dc beam resonator voltage. The total tuning range increases relatively rapidly with the mode number n. For n equal to 6 the tuning range is approximately twice the half power bandwidth of the loaded resonator with no beam present. The oscillator exhibits some minor mode distortion and hysteresis phenomena. (Author)

PB 155 734 $1.60

Pacific Semiconductors, Inc., Culver City, Calif.
INTRINSIC-BARRIER TRANSISTOR TECHNIQUES (SILICON) by J. L. Buie. Quarterly rept. no. 11, 15 Feb-15 Apr 60, on Contract DA 36-039-sc-74887. 15 Apr 60, 14p. PSI rept. no. 3000:15-27-Q; AD-243 519.

DESCRIPTORS: *Transistors, Silicon, Design, Ultra high frequency, Manufacturing methods, Diffusion, Coatings, *Transistor amplifiers, Gold.

The physical and electrical design data is given for the 4000 mcps amplifying transistor. The structure adequately meets the objective of 10 db of power gain at 400 mcps. Initial transistors have been fabricated through the water stage, but packaging and lead attachments have not been completed. Test transistors using vapor-deposited silicon are described, and results indicate that this promises to be an important fabrication technology. (Author) (See also PB 152 659)

PB 155 745 $2.60

Pacific Semiconductors, Inc., Culver City, Calif.
TRANSISTOR, VHF, SILICON POWER (3W-70MC), by S. H. Barnes, N. P. Burcham, and B. Rappaport. Quarterly rept. no. 1, 21 Jan-20 Apr 60, on Contract DA 36-039-sc-85255. [1960] 22p. PSI rept. no. 4000:6-1-Q; AD-241 799.

DESCRIPTORS: *Transistors, Very high frequency, Silicon, Design, Manufacturing methods, Radiofrequency power.

Efforts are being made to develop, fabricate, and deliver 400 transistors fabricated to meet the following basic requirements: (1) at 70 mc and 3.0 w output the power gain shall be 10 db, (2) the amplifier collector efficiency shall be equal to or greater than 40%, and (3) the operating voltage shall be less than 80 v. Other specific objectives are: (1) minimum BV_{CES}, collector-to-emitter breakdown voltage (base shorted to emitter), shall be twice the operating voltage, (2) minimum collector current - 200 ma, (3) minimum collector dissipation at 25°C case temperature - 10 w, (4) storage temperature -65°C to +200°C, and (5) storage life - 1,000 hours at 200°C. Device design optimization and process refinement were the major objectives during the first contract quarter. Suitable progress was made in these areas. The fabrication of experimental quantities of 3W-70MC transistors has commenced. Preparations are being made to introduce photo-resist techniques to form the required device geometry. This has constituted the largest single effort during the past quarter. (Author)

PB 156 634 $3.60

Pacific Semiconductors, Inc., Culver City, Calif.
TRANSISTOR, VHF, SILICON, POWER (3W-70MC), by S. H. Barnes, N. P. Burcham and others. Quarterly rept. no. 3, 21 July-20 Oct 60, on Contract DA 36-039-sc-85255. [1960] 39p. PSI rept. no. 4000:6-3-Q; AD-251 058.

DESCRIPTORS: *Transistors, Very high frequency, Silicon, Design, Electrical properties, Manufacturing methods, Processing, Production, Tests.

The evaluation of a matrix experiment to establish final design parameters was successfully completed. Photoresist processing techniques were refined. These major achievements made it possible to scale up the engineering pilot run effort to produce the final engineering test model transistors. (Author) (See also PB 155 745)

PB 156 965 $2.60

Philco Corp., Blue Bell, Pa.
BASIC STUDY INTO THE MECHANISM OF THE MgO-TYPE COLD CATHODE EMISSION, by R. Johannes and K. Ramanathan. Semi-annual rept. no. 1, 15 June-15 Dec 60, on Contract DA 36-039-sc-85345. 30 Dec 60, 25p. 27 refs. AD-254 452.

DESCRIPTORS: *Cathodes (Electron tubes), *Oxide cathodes, *Cold cathode tubes, Secondary emission, Quantum mechanics, Field emission, Magnesium compounds, Oxides, Metallic compounds, Crystals, Coatings, Semiconductors, Electron tubes, Theory.

The report describes research into the fundamental principles of MgO cold cathode emission, based upon experimental data and materials supplied by Tung-Sol Research Laboratories. A working model of the MgO cathode, based on classical concepts, has resulted from the work to date. Experimental evidence obtained with this model agrees in general with reports in the literature; its complete validation awaits further research. A literature search has been finished and theoretical studies have been done. The significant results of the survey are discussed. Included in the theoretical work were studies of collective electron excitation in metallic oxides, and processes in secondary emission within ionic crystals. A hypothesis explaining cold cathode emission was advanced; this is based upon consideration of factors such as quantum mechanical tunnelling from metal to cathode coating, the importance of the MgO coating as an electron emitter, and the effect of porous MgO coatings. The hypothesis was used to analyze the experimental work by Tung-Sol. (Author)

PB 157 297 $1.10

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
RESEARCH ON PARAMAGNETIC RESONANCES, by R. L. Kyhl and M. W. P. Strandberg. Quarterly progress rept. no 1, 15 Sep-15 Dec 60, on Contract DA 36-039-sc-87376, continuation of Contract DA 36-039-sc-74895. [1960] 10p. 1 ref. AD-252 573.

DESCRIPTORS: *Paramagnetic resonance, Ruby, *Cavity resonators, *Color centers, Phonons, *Microwave equipment, *Microwave amplifiers, *Quartz resonators, Amplifiers, Microwaves, Quartz crystals, Maser.

The purpose of this research is to obtain and investigate amplification by inverting the population of a paramagnetic mechanical system. An amplifier for this purpose is known as a Versitron or solid-state maser. Techniques now under investigation include inversion by 180-degree pulses with a two-level system, and cw pumping with a three-level system. Present status of the reactance-compensated amplifier design is described. Preliminary measurements of direct acoustic saturation of F-center spins in quartz are reported. (Author)

PB 155 847 $2.60

Rutgers State U. Coll. of Engineering, New Brunswick, N. J.
STUDY OF SLOW-WAVE STRUCTURES, by Joseph F. Dienst. Semi-annual progress rept. no. 1, 1 Jan-30 June 60, on Contract DA 36-039-sc-85332. [1960] 25p. 23 refs. Rept. no. ML002-0760P2; AD-249 511.

DESCRIPTORS: *Traveling wave tubes, *Electronic circuits, Electronic equipment, *Waveguides, Ferrites, Electromagnetic waves, *Electromagnetic theory.

A dispersion relation is derived for a disk-loaded circular waveguide which is perturbed so that alternate sections have the same inside diameter. The expression obtained implicitly contains the omega-beta variation for the structure considered, but no explicit omega-beta characteristic is plotted because of the complexity of the dispersion relation. The problem of investigating the omega-beta characteristic of a disk-loaded circular waveguide containing ferrite rings is proposed. (Author)

PB 159 163 $5.60

Sperry Gyroscope Co., Great Neck, N. Y.
RADAR BEACON AN/APN-69(XA-2). Final engineering rept. on Contract AF 33(038)6854. Jan 54, declassified. 52p. Sperry rept. no. 5223-1261-9; AD-35 144.

DESCRIPTORS: Airborne, *Radar beacons, X-band, Design, Construction, Tests.

A description is given of the construction and testing of 25 XA-2 beacons. The XA-2 was designed to operate with air-borne x-band radar systems having beacon interrogating and receiving facilities; it provides identification, azimuth, and range information to the radar systems. The beacon equipment consists of the receiver-transmitter RT-204(XA-A), the radar set control C-812(XA-A), and the antenna AS-521(XA-A). The electrical characteristics of the lightweight airborne XA-2 beacon were similar to those of the XA-1 model and were in general accord with USAF Spec MCREE-803. The weight of the receiver-transmitter unit was reduced 9 lb. Numerous modifications improved the circuit performance and reliability, simplified the circuit alignment, and simplified the manufacture and maintenance of the equipment. The design test of the XA-2 beacon was successful, and over-all operation was good. The beacon met all the specification requirements of the design tests except for the requirements on interference of USAF Spec 7274.

With the use of a filter unit external to the receiver-transmitter, the conducted noise was reduced to well within the requirements, and radiated noise was only slightly over the maximum allowed.

PB 156 549 $3.60

Sperry Microwave Electronics Co., Clearwater, Fla.
DEVELOPMENT OF C-BAND BEACON FERRITE DUPLEXER. PHASE II, by J. Clark and G. Harrison. Quarterly progress rept. no. 2, 1 Oct-31 Dec 60, on Contract DA 36-039-sc-85330. Jan 61, 38p. 12 refs. Rept. no. SJ-220-0029-2; AD-254 443.

DESCRIPTORS: *Miniature electronic equipment, C band, Ferrites, *Radar duplexers, Design, *Transmission lines, *Limiters, Microwave equipment, *Radar beacons.

Investigation indicates that the C-band gyromagnetic coupling limiter is best suited for use on this program. The reduction in desirability of the parametric varactor limiter was brought about by the establishment of the requirement for operation into an antenna arm VSWR of up to 2.0 which, in turn, requires that the limiter be capable of satisfactory operation with a maximum input power of 4-5 kw peak and 4-5 watts average. Progress in the development of the gyromagnetic coupling limiter was hampered by the lack of an efficient technique for making highly polished single crystal YIG samples which was solved by the construction of an effective polishing mechanism. The prime difficulty at present with the C-band gyromagnetic coupling limiter appears to be the problem of simultaneously obtaining low insertion loss and a tuning range from 5.4 to 5.9 kmc. (Author) (See also PB 155 846)

PB 157 373 $2.60

Stanford Electronics Labs., Stanford U., Calif.
AN ADAPTIVE "ADALINE" NEURON USING CHEMICAL "MEMISTORS", by B. Widrow. Rept. on Contract Nonr-225(24). 17 Oct 60, 27p. 10 refs. Technical rept. no. 1553-2; AD-244 790.

DESCRIPTORS: *Switching circuits, *Subminiature electronic equipment, *Digital computers, Electrical networks, Electronic circuits, Memory devices, Resistors, Digital systems, *Variable resistors.

A new circuit element called a "memistor" (a resistor with memory) has been devised that will have general use in adaptive circuits. With such an element it is possible to get an electronically variable gain control along with the memory required for storage of the system's experiences or training. Experiences are stored in their most compact form, and in a form that is directly usable from the standpoint of system functioning. The element consists of a resistive graphite substrate immersed in a plating bath. The resistance is reversibly controlled by electroplating. The memistor element has been applied to the realization of adaptive neurons. The memistor promises to be a cheap, reliable, mass-producible, adaptive-system element. (Author)

PB 153 410 $3.60

Stanford Electronics Labs., Stanford U., Calif.
BIFILAR HELIX WITH SELECTIVE LOSS, by R. P. Lagerstrom and D. C. M. Lin. Rept. on Contract AF 33(616)6207. 29 July 60, 40p. 5 refs. Technical rept. no. 490-3; AD-247 324.

DESCRIPTORS: Helixes, *Traveling wave tubes, *Electronic circuits, Oscillation, Propagation, *Waveguides

A new slow-wave structure for wide-band high-power traveling-wave-tube applications was analyzed and tested. The circuit is a bifilar helix which was made to be selectively lossy in the mode which otherwise would cause oscillations. Two and a half decibels attenuation per wavelength was introduced into the backward wave at the oscillation frequency. The forward wave, at the same time, suffered only 0.6 decibels per wavelength over a wide forward-wave frequency band up to ka = 0.75. The theory suggests that better selectivity than this can be achieved. The circuit consists of a double tape helix supported from the inside by four sapphire rods parallel to and equally spaced on an inner, cylindrical, conducting tube. The tubing was made resistive in the circumferential direction and perfectly conducting in the longitudinal (axial) direction. The tubing and the supporting rods were uniform in the axial direction and were of relatively simple construction. (Author)

PB 158 036 $8.10

Stanford Electronics Labs., Stanford U., Calif.
EXPERIMENTAL MEASUREMENTS OF 1/f NOISE IN GERMANIUM FILAMENTS, by P. O. Lauritzen. Rept. on Contract Nonr-225(44). 30 Nov 60, 84p. 22 refs. Technical rept. no. 1704-1; AD-251 072.

DESCRIPTORS: Germanium, *Filaments, Crystals, Noise, Low frequency, *Semiconductors, Surfaces, Transistors, Diodes, Tests, Measurement, *Noise (Radio), Magnetic fields, Electrical properties, Coatings

Measurements were conducted on 1/f noise in germanium filaments with the intent of checking some previously proposed theories and of isolating, by a continuous series of experiments, some of the characteristics of the noise. The original approach was to determine the effect of intentional surface doping on the 1/f noise magnitude. It later appeared that some of the noise was coming from a source other than the surface, and further experiments were directed at isolating and examining the properties of the different types of noise. The experiments included measurements of the frequency spectrum, noise correlation, temperature dependence, sensitivity to current level, and effects of a magnetic field. Surface 1/f noise depends upon the existence of an inversion layer at the surface. A model is presented which considers the possibility of noise generated in high field regions created by surface inclusions. (Author)

PB 157 374 $10.50

Stanford Electronics Labs., Stanford U., Calif.
HIGH-LEVEL INJECTION EFFECTS IN TRANSISTORS, by R. A. Manhart. Rept. on Contract Nonr-225(24). 9 Sep 60, 133p. 40 refs. Technical rept. no. 1751-1; AD-246 641.

DESCRIPTORS: *Transistors, Electric fields, Electrical properties, Mathematical analysis, Analysis, Voltage, *Semiconductors, Electric currents, Electric discharges, Electron transitions, Electron capture, Crystals, Theory

A theoretical analysis of the one-dimensional diffusion transistor, including the effect of the electric field present in the base, is presented for general base boundary conditions. Expressions are derived for the electric field intensity and minority carrier density throughout the base. The base stored charge is determined, as well as its rate of change with minority-carrier current, which is shown to be inversely proportional to the characteristic frequency of the transistor. The quasi-Fermi levels throughout the transistor are considered, and the total voltage drop across the transistor is determined for general boundary conditions. Junction boundary relations are considered, and the limitations of the usual boundary conditions are presented. The equations pertaining to the diffusion transistor are modified by the inclusion of base recombination, assuming this to obey the mass-action law. The equations of the drift transistor, including base recombination according to the mass-action law, are derived. Results are given corresponding to those presented for the diffusion transistor including base recombination. In addition, the variation of certain parameters of the incremental equivalent circuit is briefly presented. (Author)

PB 152 969 $12.50

Stanford Electronics Labs., Stanford U., Calif.
HOLLOW-BEAM ELECTROSTATICALLY FOCUSED HIGH-POWER TRAVELING-WAVE TUBE, by G. Novick. Rept. on Contract AF 33(616)6207. 12 Oct 60, 177p. 27 refs. Technical rept. no. 406-2; AD-245 843.

DESCRIPTORS: *Traveling wave tubes, Electron tubes, Focusing, Electrostatics, *Microwave equipment, Design, Tests, Mathematical analysis

A high-power traveling-wave tube using periodic electrostatic focusing was designed, constructed and tested. A hollow electron beam was used, with a single RF helix on the outside, biased at a small negative potential with respect to the anode. A set of periodic disks was used on the inside of the electron beam. These disks were connected alternately to a negative and a positive focusing voltage with respect to the anode. The dc beam transmission obtained was considerably below the design objective. The voltage breakdown between adjacent focusing disks in the presence of the electron beam was below its value with no electron beam present. The RF tests made at the reduced beam current and power agreed very well with established traveling-wave tube theory. A new theory was derived which agrees very well with the dc beam transmission obtained. The resulting equation relates the beam perveance to the magnitude of the focusing electric field along the inner beam edge. If the distance between the electron beam edge and the focusing structure is increased, with a corresponding increase of the focusing voltage, the original tube design objectives can be achieved. (Author)

PB 157 375 $3.60

Stanford Electronics Labs., Stanford U., Calif.
LINEARIZATION OF CONTACTOR CONTROL SYSTEMS BY EXTERNAL DITHER SIGNALS, by T. Ishikawa. Rept. on Contract Nonr-225(24). 1 Oct 60, 34p. 4 refs. Technical rept. no. 2103-2; AD-244 952.

DESCRIPTORS: Control systems, Motor starters, Hysteresis, Statistical analysis, *Servo systems, Tests, Analog computers, *Relays, Signals, High frequency

The problem studied is a linearization of control systems having non-linear components, such as relays with dead-zone or hysteresis, by an application of high frequency signals to the non-lear devices. Such signals are called "dithers". The linearization problem is regarded as the establishment of a linear relation between the input and the output of the non-linear element with respect to the average or the mean. With this consideration, the mean of the output is computed in terms of the statistics of the dither for dc input which may include slowly varying signals. The output means are computed for contactors with imperfections for periodic and random-wave dithers. It is shown that by the use of a triangular wave, contactors with dead-zone or with hysteresis can be linearized perfectly between the saturation limits. A number of experiments have been performed on an analog computer to study the system application of the dither. It is shown that periodic waves can linearize contactor systems quite well. It is found that a random noise can also be used as the dither. (Author)

PB 155 351 $9.60

Stanford Electronics Labs., Stanford U., Calif.
A THEORY OF RELATIONS BETWEEN SEQUENTIAL AND COMBINATIONAL REALIZATIONS OF SWITCHING FUNCTIONS, by R. A. Short. 12 Dec 60, 119p. 5 refs. Technical rept. 098-1; AD-253 137.

DESCRIPTORS: *Communications theory, Switching circuits, Relays, Algebras, Matrix algebra, Digital systems

It is postulated that a useful theory of relations can be established between important classes of sequential and combinational digital networks. Such a theory could be useful in describing basic digital processes and in illuminating the essential differences between the two kinds of physical realizations of switching functions. The basic objectives are formalization of these relations and development of procedures for transforming readily from one kind of network to another. By means of an abstract binary decision element, a particular kind of directed graph is defined that can be variously interpreted as a transfer contact network, a binary-decision program, or a particular kind of state diagram. These correspondences, plus certain functional assumptions, imply a set of rules governing permissible graph interconnections. Further restrictive assumptions extend the correspondences to include iterative combinational networks and conventional state diagrams. Transformation procedures between graphs with different interconnection rules and different minimization criteria are developed. (Author)

PB 156 876 $8.60

Stanford Electronics Labs., Stanford U., Calif.
TRIGGERING OF AVALANCHE TRANSISTOR PULSE CIRCUITS, by R. B. Seeds. Rept. on Contract Nonr-225(24). 5 Aug 60, 99p. 17 refs. Technical rept. no. 1653-1; AD-246 642.

DESCRIPTORS: *Transistors, Electronic circuits, Regeneration, Quantitative analysis, *Pulse generators *Trigger circuits, Geometry, Theory

A new method is described of triggering avalanche transistor pulse circuits which is called "collector" triggering and which meets the requirement of having associated delays of only a few millimicroseconds. A quantitative theory is developed which gives the optimum biasing conditions for these circuits and which is able to predict with a fair amount of accuracy the delays to be expected for a specific form of collector triggering. The theory is then qualitatively extended to show that in more practical collector triggering circuits comparably short delays should also be expected. Experimental measurements of actual trigger delays tend to support the theory. It is also shown that collector type triggering is applicable to circuits employing punch-through avalanche transistors or transistors wherein punch-through of the base region occurs simultaneously with avalanche multiplication. These circuits are capable of producing pulses with one or two watts of peak power density having base widths of less than one millimicrosecond, and they exhibit trigger delays of three or four millimicroseconds when driven with a normal amount of trigger power. (Author)

PB 155 729 $8.60

Stanford Electronics Labs., Stanford U., Calif.
WHISTLERS-WEST IGY-IGC SYNOPTIC PROGRAM, by R. A. Helliwell and D. L. Carpenter. Final rept. on National Science Foundation Grants IGY 6.10/20 and G-8839. 20 Mar 61, 92p. 26 refs. AD-254 279.

DESCRIPTORS: *Ionospheric disturbances, Ionosphere, Ionospheric propagation, Very low frequency, Recording systems, Analysis, Atmospherics

Tape recordings of whistlers and VLF ionospheric noise (VLF emissions) were taken at ten western-hemisphere stations operating from 1 July 57-31 Dec 59. The methods for handling tapes and performing aural analyses are described. New methods for analyzing the spectra of whistlers are introduced, including techniques for locating whistler souces and for measuring whistler dispersion. Whistlers and VLF ionospheric noise are classified and extensively illustrated with Sonagrams from the IGY-IGC tapes. Their variations in occurrence are discussed with respect to time of day, season of the year, and latitude. It is shown that the latitude of maximum noise occurrence moves equatorward during times of magnetic disturbance. Quantitative analyses of whistler dispersion are presented and are used to justify a sampling method for dispersion studies that requires only one whistler from each recording day. Examples of certain types of whistlers are analyzed, including a coupled-path echo train and a hybrid. Results of research on nose whistlers are summarized. (Author)

PB 156 553 $6.60

Sylvania Electric Products, Inc., Woburn, Mass.
MICROMINIATURIZED PACKAGING OF 2N384 AND 2N697, by L. Epstein, C. Lawrenson, and J. McManus Quarterly rept. no. 1, 1 Oct-31 Dec 60, on Contract DA 36-039-sc-85377. [1961] 65p. AD-253 928.

DESCRIPTORS: *Transistors, Germanium, Silicon, Packaging, *Subminiature electronic equipment, Design, Reliability, Production, Manufacturing methods.

Efforts are being made to design, develop and construct a microminiature package for germanium and silicon transistors which is smaller than but has equal or better reliability than a conventional welded can. Modifications in size and tabbing arrangements were made in germanium alloy dice similar to 2N384's so that they would fit in a conventionally welded kovar-glass package having external height and diameter of 0.070 inch and 0.265 inch respectively. Experimental samples were made, evaluated and submitted to the Signal Corps. No unusual difficulties were encountered. Standard 2N697 dice were mounted in a kovar-glass microminiaturized package modified with a molybdenum heat spreader. (Author)

PB 156 565 $4.60

Tung-Sol Electric, Inc., Bloomfield, N. J.
RESEARCH AND DEVELOPMENT IN UTILIZATION OF SELF-SUSTAINED ELECTRON EMISSION INVESTIGATION, by B. G. Firth, Warren C. Johnson, and Donald W. Mayer. Quarterly rept. no. 2, 1 Apr-30 June 60, on Contract DA 36-039-sc-85120. 30 June 60, 44p. AD-242 424.

DESCRIPTORS: *Cold cathode tubes, Magnesium compounds, Oxides, Oxide cathodes, Life expectancy, Tests, Field emission, Coatings, Nitrides, Test equipment, Photoemission, Diodes, Thermonic emission, Electrostatics

Very uniform reproducible cathode coatings have been made by electrostatic deposition of MgO smoke. This is accomplished by burning Mg in air at atmospheric pressure with an application of 20 to 50 KV positive potential on the cathode with respect to the negatively grounded burning Mg. Cathodes glowed pink or red in processed tubes when coated at 50 per cent or more relative humidity (RH). The humidity had to be kept below 35 per cent RH to make them blue or violet blue. Coating thickness for a given weight varied with humidity. Thus far, the operating stability has not been as good as for sprayed cathodes. Those processed with low pressure CO_2 instead of air were also made to operate, but with very short life. The apparent inductance of the MgO cathode is frequency dependent as well as current dependent, but less so for "cooled" cathodes operating at high current density. The spread of apparent inductance from tube to tube becomes greater as fewer electrons are allowed to return to the cathode. Smoked and sprayed cathodes are about the same in these respects. (Author)

PB 156 632 $3.60

Tung-Sol Electric, Inc., Bloomfield, N. J.
RESEARCH AND DEVELOPMENT IN UTILIZATION OF SELF-SUSTAINED ELECTRON EMISSION INVESTIGATION, by B. G. Firth, Warren C. Johnson, and Donald W. Mayer. Quarterly rept. no. 3, 4 July-3 Oct 60, on Contract DA 36-039-sc-85120. 3 Oct 60, 38p. AD-249 096.

DESCRIPTORS: *Oxide cathodes, Magnesium compounds, Oxides, *Cold cathode tubes, Field emission, Coatings, Nitrates, Electrostatics, Design, Luminescence, Photoemission, Thermonic emission

Progress is reported on studies of electrostatic smoked MgO cathodes, coating densities, coating additives, cathode interface studies, low-work function interface cold cathode, study of "pop-out" time for MgO cold cathode, and electron velocity distribution apparatus. No correlation was found between MgO coating thickness and anode-to-cathode voltage drop. Sprayed coating densities were 0.1 times that of solid MgO (3.7 gms/cm to the third power). Smoked coatings were 01 times the same. Anode-to-cathode voltage drops for electrostatically smoke coated cathodes were reduced from 200 volts to 150-125 volts by means of a low-work function interface between the nickel sleeve and MgO. Salts of Ba, Ca, Cs, K, Li, Na, Sr, and U, fired on the nickel sleeve, would do this. Cathode operating stability was thus enhanced. No back bombardment appeared to be required to sustain emission. Study of cathode "pop-out" revealed a series of current drops lasting from 5 microseconds to 40 microseconds, each drop requiring less than 3 microseconds. Small electron velocity analyzer tubes were developed capable of measuring within 5% accuracy. Measurements made with sprayed cathodes showed electron velocities peaked at 13 to 16 volts. (Author) (See also PB 156 565)

PB 159 161-1 $6.60

Westinghouse Research Labs., Pittsburgh, Pa.
THERMOELECTRICITY. Quarterly progress rept. no. 1 on Contract NObs-77043. 11 Feb 59, 68p. 27 refs. Scientific paper 431FD405-P1; AD-214 302.

DESCRIPTORS: *Thermoelectricity, *Thermoelectric generators, Direct current, *Semiconductors, Materials, Thermal conductivity, Electrical properties, Generators

Included in the report is:
Scientific paper no. 431FD405-P1. Thermoelectric Material, by R. Bowers, J. E. Bauerle, and A. J. Cornish

Contents:
Summary of materials development program; $Bi_{2-x}Sb_xTe_{3-y}Se_y$; III-V compounds; $PbTe_{1-x}Se_x$; $Mg_2Si_xSn_{1-x}$; Transition metal silicides; Vanadium carbide; GeTe and related compounds; $La_xBa_{(1-x)}TiO_3$; Na-Ca-Nb-O system; La-Ca-Mn-O system; Cerium sulfides; Cerium selenide; Th-S; High temperature thermal conductivity apparatus; Thermal conductivity; Resistivity profile measurements; $InAs_{1-x}P_x$ as a thermoelectric material

PB 159 161-2 $12.00

Westinghouse Research Labs., Pittsburgh, Pa.
THERMOELECTRICITY. Quarterly progress rept. no. 2 on Contract NObs-77043. 11 May 59, 161p. 19 refs. Scientific paper 431FD410-P3; Research memo. 431FD410-M1; AD-216 781.

DESCRIPTORS: *Thermoelectricity, Generators, *Thermoelectric generators, Direct current, *Semiconductors, Materials, Thermal conductivity, Vapor pressure, Determination.

Included in the report are:
Scientific paper 431FD410-P3. Computation of efficiency of thermoelectric devices, by B. Sherman, R. R. Heikes and R. W. Ure, Jr.
Research memo. 431FD410-M1. Radiative heat transfer in thermoelectric materials, by T. D. Holstein (See also PB 159 161-1)

PB 159 161-3 $14.50

Westinghouse [Research Labs.] Pittsburgh, Pa.
THERMOELECTRICITY. Quarterly progress rept. no. 3 on Contract NObs-77043. 13 Aug 59, 219p. 71 refs. AD-228 529.

DESCRIPTORS: *Thermoelectricity, *Thermoelectric generators, Generators, Direct current, *Semiconductors, Materials, Thermal conductivity, Electrical properties, Sintering, Phase studies, Castings, Electron beams, Electron bombardment, Vacuum systems, Measurement, Instrumentation

Included in the report are:
Scientific paper 431FD405-P3. Materials for thermoelectric applications, by R. W. Ure, Jr., R. Bowers and R. C. Miller
Research memo. 431FD401-M2

Scientific paper 431FD413-P3. The germanium-tellurium phase diagram in the vicinity of the compound GeTe, by J. P. McHugh and W. A. Tiller
Research rept. 431FD401-R1. Sintered PbTe for thermoelectric application, by P. E. Snyder and R. J. Sladek
Research rept. 431FD402-R1. Design and operation of a small electron beam furnace, by H. Johansen, P. Snyder and J. Cleary
Scientific paper 431FD413-P2. The use of controlled solidification for polycomponent phase diagram and ingot segregation studies, by M. L. Hill, J. P. McHugh and W. A. Tiller
Research memo. 431FD407-M1. A proposed high temperature thermal conductivity apparatus, by J. E. Bauerle
Scientific paper 431FD405-P4. Apparatus for accurate measurement of thermoelectric power, by R. Eisner
Scientific paper 431FD407-P1. Trands in the lattice thermal conductivity of the oxides, by C. Gallo
(See also PB 159 161-2)

Ordnance, Missiles, and Satellite Vehicles

PB 155 995-1 $13.50

Aerojet-General Corp., Azusa, Calif.
DESIGN AND DEVELOPMENT OF PRESSURE-SENSING SWITCH, by E. P. Butler, S. J. Crosby and others. Final rept. on Contract AF 04(647)164. Dec 59

193p. 1 ref. Rept. no. 1730, Volume I; AFBMD-TR-59-23(I); AFBMD Doc. no. 60-496; AD-230 553.

DESCRIPTORS: *Pressure switches, Design, *Guided missiles, Surface to surface, Instrumentation.

A pressure switch was designed for ballistic-missile application. The work performed can be divided into 3 phases: (1) user survey and definition of switch-design criteria; in this phase, specifications were also prepared for the switch configuration and test procedures; (2) selection of the preferred switch configuration and the development and testing of such a switch; and (3) basic research on springs, pressure-sensing elements, and subminiature switches in order to obtain a better understanding of the behavior of these parts under extreme environments, and to better define the critical design parameters. The switch selected consisted of a column spring as a pressure-sensing element, and a subminiature switch as an electrical contact. The switch was hermetically sealed and was provided with a temperature-compensating device to reduce the shift in the actuation pressure at extreme ambient temperatures. (Author)

PB 155 995-2 $10.10

Aerojet-General Corp., Azusa, Calif.
DESIGN AND DEVELOPMENT OF PRESSURE-SENSING SWITCH, by E. P. Butler, S. J. Crosby and others. Final rept. on Contract AF 04(647)164. Dec 59, 121p. Rept. no. 1730, Volume II; AFBMD-59-23(II); AFBMD Doc. no. 60-496; AD-230 554.

DESCRIPTORS: *Pressure switches, Design, *Guided missiles, Surface to surface, Instrumentation, Specifications.

Covering the design and development of a pressure switch for ballistic-missile application, the switch-design criteria is defined based on a user survey. The selection and development of a switch configuration, as well as the basic research work done on column springs, bellows, and a subminiature switch are described. (Author) (See also PB 155 995-1)

PB 155 334 $6.60

Ammunition Group, Picatinny Arsenal, Dover, N. J.
INVESTIGATION OF THREADED JOINT SEALANTS AND CRIMPED JOINT SEALANTS, by W. Gaston. Final engineering rept. Dec 60, 64p. 20 refs. Technical rept. DC-TR: 2-60; AD-252 992.

DESCRIPTORS: *Seals, *Sealing compounds, Rubber seals, *Ammunition, Production, Joints, Manufacturing methods, Oxygen, Design, Metals, Torque, Rubber, Polymers, Sulfides, Storage, Explosives.

Evaluation was confined to materials which set in the absence of air. None of those examined are suitable for general use in ammunition items, although some are satisfactory for certain ammunition applications. For each use considered, it is necessary to make a separate determination of compatibility with the explosive used, method of application to obtain satisfactory penetration, and acceptable setting time and permissible torque range with the metals involved. At present it is considered impracticable to attempt the formulation of better sealants of the type discussed. (Author)

PB 155 482 $8.10

Ammunition Group, Picatinny Arsenal, Dover, N. J.
TRACER-SD UNIT FOR THE 37 MM T324E22 SHELL (VIGILANTE), by Stanley J. Lowell and Fred K. Van Arsdel. Jan 61, 81p. 5 refs. Technical rept. DR-TR: 3-60; AD-253 308.

DESCRIPTORS: *Projectiles, Nose fuzes, *High explosive ammunition, Igniters, Tests, *Base detonating fuzes, *Tracers (Ordnance), Insulating materials, Antiaircraft ammunition, Design

The approved design for the tracer-SD unit consists of a relay assembly loaded with approximately 63 milligrams of PETN and fastened on the forward end of the tracer housing. The tracer housing is loaded with 8.3 grams of tracer composition and 1.6 grams of K-29 igniter composition pressed at 120,000 psi and .75 gram of loose K-29 igniter composition placed on top of the pressed igniter composition. A Temflex 105 plastic sleeve approximately .025 inch thick is used to insulate the relay end of the tracer housing from the surrounding high explosive projectile charge. Coating of the internal threads of the tracer housing is accomplished with an application of Thiokol LP-3/C-5 activator, which thermally insulates the tracer-igniter composition and holds it in place. The booster pellet is 98/2-RDX/stearic acid weighing approximately 6.75 grams. Reliability of this tracer-SD design is attested by the 150 consecutive 37 mm rounds fired with only one malfunction; this one failure was the result of non-ignition of the tracer mixture. Functioning times were consistently between 10 and 12 seconds. (Author)

PB 149 536 $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
DESTRUCT TYPE FLASH-SMOKE WARHEAD FOR THE 318 MM FREE ROCKET (LITTLE JOHN), by John E. Andrews, Jr. Jan 61, 26p. 13 refs. Technical rept. FRL-TR-7; AD-249 568.

DESCRIPTORS: *Rockets, Artillery rockets, Warheads, Rocket heads, Training ammunition, Smoke rockets, *Smoke warhead

A practice warhead was developed for the 318mm free rocket (Littlejohn). This destruct type warhead: (a) Produces sufficient flash and smoke to be easily detected day or night over a range of 12 miles. The flash and smoke represent the burst of a tactical warhead. (b) Uses plastic material so as to minimize the lethality of the fragments. (c) Has the same size, shape, and center of gravity as a Littlejohn tactical warhead. (d) Requires no modification to the skin or other rocket components for mounting to the warhead skin. (e) Operates with auxiliary equipment between temperature limits of -40 F and 130 F. (f) Requires no special field handling equipment. The pyrotechnic device for the practice warhead consists of a smoke container, three ballast containers, a spotting charge container, and an initiation system packaged in a plastic cylinder 11.25 inches in diameter and 24 inches long. Since the detonation rate of the spotting composition is slow (900 meters/second), the spotting charge container had to be placed at the point of initiation to take advantage of the confinement of the outer plastic case. The spotting container itself had to be

made of aluminum instead of plastic, because of the blast characteristics of Spotting Composition 580. (Author)

PB 154 983 $2.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
FIELD TRIALS OF THE PROPELLANT QUICK TEST ON PROPELLANT INCREMENTS AND PROPELLING CHARGES, by Norman E. Beach. Dec 60, 23p. 11 refs. Technical note no. FRL-TN-19; AD-251 883.

DESCRIPTORS: *Propellants, Temperature, Tests, Test methods, Stability, Cotton, Decomposition, Deterioration, Containers, Silk, Climatic factors, Absorption, Rayon fibers, *Propelling charges, Storage

The Propellant Quick Test fails in reflecting the order of stability of the propellant within the cotton-bagged increments. It shows that the cotton bagging affects this indicator-paper test through absorption and consumption of the gaseous decomposition products of the deteriorating propellant, thus purifying the atmosphere within the container. This phenomenon may not extend to the charges bagged in silk or rayon. A four-hour test-time for propelling charges would give a desirable overdevelopment of Propellant Quick Test color reaction; but a two-hour test-time is more functionally adaptable to Field uses. (Author)

PB 154 729 $5.60

Frankford Arsenal, Philadelphia, Pa.
STUDIES OF THE YAW OF A SPINNING PROJECTILE IN A DENSE MEDIUM, by F. A. Malinoski. Sep 60, 56p. 11 refs. Rept. R-1569; AD-247 603.

DESCRIPTORS: *Projectiles, *Ballistics, *Yaw, Theory, Mathematical analysis, Water, Spin, Stability, Differential equations, Velocity, Penetration, Bessel Functions, Density.

A differential equation for the yaw angle as a function of time was derived for a spinning projectile in a dense medium. For various sets of assumptions, individual solutions of the yaw angle were obtained. Since one of these solutions involved Bessel functions of large order and could be approximated with an asymptotic formula by the method of steepest descent, this method is briefly discussed, and the derivation of the Bessel function approximation is presented. The differential equation was also programmed on the analog computer. The constants required for the computation are listed for the caliber .30, ball, M2 and the caliber .22, ball, carbine. The yaw angle solutions, the velocity, and penetration distance for these two projectiles in water at a range of 300 yards are given in both tabular and graphical form. Projectile characteristics important in causing quick tumbling are discussed. (Author)

PB 156 552 $3.60

Georgia Inst. of Tech. Engineering Experiment Station, Atlanta.
STABILITY STUDIES OF QUARTZ CRYSTALS FOR SATELLITES, by R. B. Belser and W. H. Hicklin. Quarterly rept. no. 2, 1 Oct 60-1 Jan 61, on Contract DA 36-039-sc-85363. [1961] 33p. ARPA Order no. 54-60; AD-253 797.

DESCRIPTORS: Quartz crystals, Crystals, *Quartz resonators, Temperature, Radiation tolerance, Frequency, Measurement, Very high frequency, Stability, Instrumentation, *Satellite vehicles, Silver plating, Plating, Storage, Production.

The purpose of this project is to develop 100 mc resonators able to maintain frequencies which vary no more than + or - 0.3 ppm/yr and, ultimately, which vary no more than + or - 0.1 ppm/yr. Primary effort was directed toward improvement of the frequency measuring technique to assure a precision near + or - 10 to the 8th power for routine frequency measurements. Improvements of the previously used VHF bridge by temperature control of the bridge itself, better coaxial lines and connectors, and reductions of voltage irregularities supplied to the screen grid of the oscillator tube of the CI Meter TS-15, brought the precision of the measurements approximately to the desired value. Simultaneously a second capacitance bridge, isolated from the oscillator by a ferrite transformer and having one terminal of the crystal grounded, was designed and constructed. This unit, in initial tests has given comparable accuracy. Seventy crystal units have been fabricated. Aging measurements have been continued for units stored at 60 C. (Author)

PB 181 085 $6.00

Joint Military Packaging Training Center, Rossford Ordnance Depot, Toledo, Ohio
COURSE OUTLINES. 400-L-F5 (I) PRESERVATION AND INTERMEDIATE PROTECTION. Jan 60, rev. 26 Feb 60, 455p. 267 refs.

DESCRIPTORS: *Containers, *Packaging, Military requirements, *Cargo, Loading, Handbooks.

Contents:
Introduction to preservation and intermediate protection
General departmental packaging policies
Packaging specifications
Cleaning
  Cleaning, C-1 processes
  Cold solvent cleaning and drying procedures
  Vapor degreasing
  Alkaline, electro, emulsion, steam and abrasive cleaning
  Cleaning inspection and tests
Preservatives and their application
  Introduction to preservatives
  Types of preservatives
  Temporary or P-type preservatives
  Selection and application of P-type preservatives
Methods of preservation
  Introduction to methods of preservation
  Cushioning, blocking, bracing and bolting
  Method of preservation: III
  Method of preservation: I
  Heat sealing
  Method of preservation: IC
  Method of preservation: IB
  Method of preservation: IA
  Method of preservation: II
  Strippable films (Sprayable)
  Controlled humidity
  Volatile corrosion inhibitors
Economy in packaging

Packaging inspection
Packaging inspection (MIL-STD-105)
Packaging inspection (MIL-P-116)

PB 181 086 $5.00

Joint Military Packaging Training Center, Rossford Ordnance Depot, Toledo, Ohio.
COURSE OUTLINES. 400-L-F5 (II) PACKING AND CARLOADING. Jan 60, rev. 29 Feb 60, 389p. 170 refs.

DESCRIPTORS: *Containers, *Packaging, Military requirements, *Cargo, Loading, Handbooks.

Contents:
Introduction to packing and carloading
General departmental packing policies
Nailed wood boxes
Fiberboard boxes
Cleated panel boxes
Wirebound wood boxes
Waterproof barrier materials
Crates
Introduction
Materials, components and assembly
Specification requirements (MIL-C-104)
Specification requirements (MIL-C-132)
Miscellaneous
Special purpose containers
Blocking, bracing and cushioning
Marking
Packing inspection
Freight regualtions
Air freight
Economy in packing
Carloading
Closed cars and trucks
Open cars

AD-259 506 $7.60

National Bureau of Standards, Washington, D. C.
THEORY OF AN ACCURATE INTERMEDIARY ORBIT FOR SATELLITE ASTRONOMY, by John P. Vinti. 22 May 61, 71p. 8 refs. NBS rept. 7154; AFOSR-690.

DESCRIPTORS: *Satellite vehicles, *Orbital flight paths, Gravity, Perturbation theory, Harmonic analysis, Integrals, Motion, Planets, Astronomy, Determination, Mathematical analysis, Fourier analysis, Transformations (Mathematics), Series, Functions.

An accurate intermediary orbit is derived of an artificial satellite of an oblate planet. The drag-free motion takes place under the action of a gravitational potential which fits the even zonal harmonics exactly through the second and approximately through the fourth, in the case of the earth. This potential leads to separability of the Hamilton-Jacobi equation. Two alternative sets of orbital elements are set forth. The first set is related directly to initial conditions, but requires numerical factoring of a certain quartic to evaluate some of the integrals. The second set permits exact factoring of both quartics that appear, but is not related directly to initial conditions, so that its members can best be obtained by a least-square fit of the solution over many orbital revolutions. The final solution is given in terms of certain uniformising variables, whose periodic terms are correct through the second order in the oblateness parameter and whose secular terms are exact, for the intermediary orbit. These exact solutions for the secular terms are expressed by means of certain rapidly converging series, with complete avoidance of elliptic integrals of the third kind. (Author)

AD-259 550 $3.60

Rock Island Arsenal Lab., Ill.
INVESTIGATION OF SOME FACTORS AFFECTING HYDROPNEUMATIC RECOIL MECHANISM FLOATING PISTON PACKING PERFORMANCE, by F. K. Blessin and L. R. Raisbeck. 10 Mar 61, 32p. 10 refs. Rept. no. 61-998.

DESCRIPTORS: *Recoil mechanisms, *Howitzers, *Hydraulic seals, *Pneumatic packings, Plastic seals, Tests, Lubrication fittings, Ethylenes, Fluorides, Polymers, Nitrogen, Rubber seals, Silicones, Nitrile rubber

An investigation was made to evaluate the effect of packing configuration, filler material, shroud material, lubricators and venting the floating piston void on the performance of floating piston packings in 105 MM Howitzer Recoil Mechanisms. Gymnastication tests were conducted, at ambient temperatures of 225F, 75F, and -65F, with eight mechanisms. Evaluations were made on the basis of the packing wear and the volume of nitrogen leakage.

Sanitation and Safety Engineering

PB 154 976 $7.60

Army Engineer Research and Development Labs., Fort Belvoir, Va.
WATER PURIFICATION EQUIPMENT SET, DIATOMITE, MOBILE 3000-GPH AND WATER PURIFICATION EQUIPMENT SET, DIATOMITE, MOBILE 1500-GPH, by Aldelmo Ruiz and Richard P. Schmitt. Rept. for Feb 54-Feb 56. 18 Apr 57, 74p. Technical rept. 1473-TR.

DESCRIPTORS: *Water, *Purification, Mobile, *Military equipment, Design, Tests, Operation, Military requirements, *Water supplies.

This report covers the development, tests, and evaluation of the 3000-gph and the 1500-gph water purification equipment sets suitable for use in temperate and subarctic climates. The assemblage of equipment employed has the necessary facilities and techniques for producing drinking water in the field from turbid and contaminated surface water sources. The two sets were demonstrated and tested under special field conditions and during severe flood conditions. Both sets meet the military characteristics. Both the 3000-gph and the 1500-gph water purification equipment sets are suitable for classification as adopted type, standard type. The 3000-gph set and the 1500-gph set are desirable replacements for the current 50-gpm Set No. 4 and the 35-gpm Set No. 3, respectively.

TID-5360(Suppl. 3) $0.75

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
A SUMMARY OF INDUSTRIAL ACCIDENTS IN USAEC FACILITIES. Aug 61, 36p.

Ship Building

PB 156 422 $2.60

David Taylor Model Basin, Washington, D. C.
APPLICABILITY OF A SUPERCAVITATING PROPELLER TO A SMALL SPEEDBOAT, by E. Venning, Jr. Nov 60, 26p. 6 refs. Rept. 1459; AD-250 364.

DESCRIPTORS: *Marine propellers, *Speedboats, Cavitation, Design, Tests.

A supercavitating propeller was designed and built to operate under conditions that might exist on a small speedboat. This propeller was later compared against two other types of speedboat propellers in laboratory tests. Computations were then made to predict the performance of a standard propeller. Comparison of the test results with the predicted performance of the standard propeller indicated that the supercavitating propeller was only equal to the standard propeller in efficiency under the conditions specified. (Author)

PB 158 484 $1.60

David Taylor Model Basin, Washington, D. C.
THE DETERMINATION OF FRICTIONAL RESISTANCE, by F. H. Todd. Mar 49, 11p. 11 refs. Rept. 663.

DESCRIPTORS: Ships, *Ship models, Surface tension, *Friction, Resistance, Determination, Surface properties.

PB 158 485 $4.60

David Taylor Model Basin, Washington, D. C.
EFFECT OF TURBULENCE STIMULATORS ON THE BOUNDARY LAYER AND RESISTANCE OF A SHIP MODEL AS DETECTED BY HOT WIRES, by John P. Breslin and Morris S. Macovsky. Aug 50, 45p. 17 refs. Rept. 724.

DESCRIPTORS: Ships, *Ship models, *Tankers, Laminar boundary layer, Turbulent boundary layer, *Boundary layer, *Turbulent flow, Turbulence, Stimulation, Tests, *Friction, Resistance.

An experimental study has been made of the effects of various methods of stimulating transition from laminar to turbulent flow in the boundary layer of a 25-foot tanker model. A hot-wire velocity instrument has been applied to determine the nature of the flow in the boundary layer. Qualitative and quantitative analyses of the results of the hot-wire surveys with a 1/8-inch rod, a 0.032-inch trip wire and a 7/8-inch fine-grain sand-strip used separately as stimulators are given. The theory of the stability of laminar flow which is briefly reviewed is used for qualitative interpretation of the boundary-layer flow found for the various test conditions. Expected increases in model resistance, because of stimulation as computed from hot-wire data, show good agreement with actual measured increases detected on the towing dynamometer when reasonable corrections are applied to the resistance data. The results of this study show that the hot-wire method is well suited to boundary-layer investigations in water, that the extent of laminar flow on the 25-foot model gives rise to a serious error in model resistance, and that measurable differences in the effects of various stimulators on the boundary-layer flow and on the model resistance can be determined. No conclusive decision can be reached as to the best stimulator, however, as a result of this study. (Author)

PB 154 316 $3.60

David Taylor Model Basin, Washington, D. C.
EXPERIMENTAL PERFORMANCE OF A SIX-BLADED VERTICAL AXIS PROPELLER, by B. V. Nakonechny. Jan 61, 38p. 40 refs. Rept. no. 1446; AD-250 168.

DESCRIPTORS: Ships, Propulsion, *Marine propellers, Propeller blades, *Hydrodynamics, Washer tunnels, Ship models, Tests.

The results are presented of experimental investigations of the performance of a 6-bladed vertical axis propeller (Voith-Schneider type). The investigations were conducted at different pitch ratios using modified cycloidal and sinusoidal blade motion. The tests were carried out at constant rpm of 600, 700, 800, 900, respectively, for a range of speeds from zero to the speed of zero thrust. The results are presented in form of performance characteristic curves using new non-dimensional coefficients of the K - lambda type adapted to vertical axis propellers. (Author)

PB 158 482 $2.60

David Taylor Model Basin, Washington, D. C.
GRAPHS FOR PREDICTING THE RESISTANCE OF LARGE STEPLESS PLANING HULLS AT HIGH SPEEDS, by Eugene P. Clement and James D. Pope. Apr 59, 28p. 4 refs. Rept. 1318.

DESCRIPTORS: *Ship hulls, *Planing surfaces, Friction, Resistance, Aspect ratio, Mathematical prediction, Hydrodynamics, Velocity

Graphs are presented for predicting the resistance of stepless planing hulls at high speeds. These graphs were developed from semiempirical equations derived by the National Aeronautics and Space Administration for the pure planing lift and center-of-pressure on flat and V-bottom planing surfaces. The development of the graphs is explained, and an example is presented to show the process of estimating the resistance of a typical large planing boat. A comparison of the resistance curves determined from model tests with the values of high-speed resistance obtained from these graphs shows good agreement. (Author)

PB 156 421 $4.60

David Taylor Model Basin, Washington, D. C.
METHODS OF ELASTIC ANALYSIS OF CIRCULAR BULKHEAD STIFFENING SYSTEMS, by S. R. Heller, Jr. and Peter M. Palermo. Nov 59, 48p. 2 refs. Rept. 1336.

DESCRIPTORS: *Girders, *Submarine bulkheads, Design, *Elasticity, Stresses, Mathematical analysis, Deflection, Moments, Shear stresses.

Various methods of elastic analysis of circular bulkhead stiffening systems are presented. The present Bureau of Ships design procedure for the main horizontal girder and vertical stiffeners is modified to include the effects of shear deformation, end load, and variable end fixity. In addition, allowance is made for deflection of the vertical stiffeners at the intersection with the main horizontal girder. A grillage analysis of the entire stiffening system, including the effects of shear deformation, end load, and variable end fixity is presented. Formulas for moments, deflection, and the shear factor k are presented, and a numerical example is given. A semigraphical, iterative design procedure that includes the advantages of the modified design procedure and the realism of the grillage analysis is presented. (Author)

PB 158 481 $1.60

David Taylor Model Basin, Washington, D. C.
OPEN-WATER CHARACTERISTIC CURVES OF AN ALUMINUM, A NYLON AND A DELRIN PROPELLER, by Richard Hecker. May 58, 11p. 4 refs. Rept. 1234.

DESCRIPTORS: *Marine propellers, Materials, Aluminum, Nylon, Plastics, Mechanical properties, *Hydrodynamics, Deflection, Tests.

The propeller efficiencies at 2400 RPM are approximately the same for the three propellers at a speed coefficient of J = 0.45. At 1200 RPM the aluminum and nylon propellers have higher efficiencies.

PB 158 472 $2.60

[David Taylor] Model Basin, Washington, D. C.
REPORT ON THE SMALL MODEL BASIN: SOME OF ITS USES AND LIMITATIONS IN SHIP MODEL RESEARCH. Dec 30, 27p. Rept. 286.

DESCRIPTORS: *Model basins, *Ship models, Model tests, Hydrodynamics, Surface tension, *Friction, Resistance, *Dynamometers.

The primary objectives of this work were: (1) To determine the practical limits of the size of small test ship models, (2) to obtain information regarding the limitations of present tank, and (3) to determine what degree of accuracy may be expected for the results obtainable with these small models.

PB 158 480 $1.60

David Taylor Model Basin, Washington, D. C.
SKIN FRICTION RESISTANCE AND THE EFFECTS OF SURFACE ROUGHNESS, by F. H. Todd. Sep 50, 17p. 7 refs. Rept. 729.

DESCRIPTORS: Ships, *Ship models, Surface tension, Surface properties, *Friction, Resistance, Model tests, Mathematical prediction.

The available data from full-scale trials are insufficient as yet to allow of special roughness allowances for different types of paint and classes of ship.

PB 158 483 $3.60

David Taylor Model Basin, Washington, D. C.
SMOOTH WATER RESISTANCE OF A NUMBER OF PLANING BOAT DESIGNS, by Eugene P. Clement and Charles W. Tate, Sr. Oct 59, 31p. 2 refs. Rept. 1378.

DESCRIPTORS: *Ship models, *Ship hulls, *Planning surfaces, Design, Friction, Resistance, Hydrodynamics, Model tests

Models of a number of different planing boat designs were towed in smooth water to provide data for guidance in designing aircraft rescue boats and similar high-speed craft. Resistance, trim, rise, and wetted surface were determined for each design for either standard or comparable conditions of hull loading and center of gravity location. The test data, lines, and hull form characteristics for each design are presented in a design data sheet. The resistances of the different designs are compared, and reasons given for significant differences. (Author)

PB 155 224 $1.60

Naval Boiler and Turbine Lab., Philadelphia, Pa.
RELIANCE GAUGE COLUMN CO. SERIES FG 1500 MICA-PROTECTED FLAT GLASS BOILER WATER GAGE, by J. Isinger. 9 Mar 61, 16p. Evaluation rept. B-428.

DESCRIPTORS: *Boilers, *Feed water, *Gages, Tests, Shipborne, Pressure, Operation, Bolts, Clamps, Watertight fittings, Mica, Glass.

A 1500 psi boiler water gage was tested to evaluate its suitability for service use. The target life of 1000 hours at operating pressure (1200 psi) was exceeded. Subject to some improvements in bolting details, the gage was considered suitable for shipboard applications. (Author)

PB 157 341 $1.10

Oregon State Coll. School of Science, Corvallis.
RESEARCH VESSEL ACONA, by Wayne V. Burt. Technical rept. no. 10 on Contract Nonr-1286(02). Sep 60, 9p. Reference 60-2; AD-244 602.

DESCRIPTORS: *Oceanographic vessel, Construction, Specifications, Analysis

FOOD, HANDLING, AND PACKAGING EQUIPMENT

Food

NYO-9933 $0.50

Massachusetts Inst. of Tech., Cambridge.
A LITERATURE SURVEY ON THE EFFECTS OF IONIZING RADIATIONS ON SEA FOODS WITH RESPECT TO WHOLESOMENESS ASPECTS(CONTINUATION), by S. A. Miller, J. T. R. Nickerson, and S. A. Goldblith. Rept. on Contract AT(30-1)-2580. July 61, 11p. 27 refs.

AD-265 492 repriced $3.50

Quartermaster Food and Container Inst. for the Armed Forces, Chicago, Ill.
PROCEEDINGS, CONTRACTORS' MEETING [NO. 7], QUARTERMASTER CORPS RADIATION PRESERVATION OF FOODS PROJECT CHICAGO, ILLINOIS 6-8 JUNE 1961. July 61, 210p. 51 refs. QMF&CI rept. no. 14-61.

DESCRIPTORS: *Food, Preservation, *Radiation effects, Biochemistry, Microbiology, Nutrition, Containers, Pathology, Physiology, Symposia.

Contents:
The quartermaster radiation preservation of foods project
Status of overseas food irradiation programs
Present status of radiation research
Studies of the wholesomeness and nutritional adequacy of irradiated foods
Summary reports of technical sessions

MACHINERY, FABRICATION, AND ACCESSORY EQUIPMENT

PB 159 101 $10.10

Bell Aerosystems Co., Buffalo, N. Y.
GROUND EFFECT MACHINES MORPHOLOGY STUDY, by Harry Mankuta. Final rept. on Contract Nonr-3074(00). Jan 61, 122p. 31 refs. Rept. no. 2017-945002; AD-252 651.

DESCRIPTORS: *Ground effect, *Vehicles, Amphibious vehicles, Antisubmarine warfare, Cargo vehicles, Jets, Transports, Design, Propulsion, Load distribution, Analysis, Control, Power, Mathematical analysis, Scout cars, Axial flow fans, Lift, Flying platforms.

Treatment is given to some of the considerations and types of systems which enter into the design of five types of GEM vehicles performing, under specified requirements, the missions of amphibious support, anti-submarine warfare, utility barge, reconnaissance car and ocean transport. A specific design is generated for each of these missions except for the ocean transport. A method is developed for selecting size, weight, or power for various size vehicles based on a separate propulsion system. It is shown that for each of the missions, a minimum size, weight, or power exists. Information was gathered through the use of a GEM morphology data sheet questionnaire on existing GEM hardware, systems components, and model tests. This is presented in tabular form for comparison purposes. (Author)

Manufacturing Equipment and Processes

PB 158 590 $1.60

Northwestern Technological Inst., Evanston, Ill.
DETERMINISTIC EQUIVALENTS FOR DIFFERENT OBJECTIVES IN CHANCE CONSTRAINED PROGRAMMING, by A. Charnes and W. W. Cooper (Carnegie Inst. of Tech.). Rept. on Temporal Planning and Management Decision under Risk and Uncertainty [and] Planning and Control of Industrial Operations, Contracts Nonr-1228(10) and Nonr-760(01). Dec 60, 13p. 11 refs. O.N.R. Research memo. no. 37; AD-250 813.

DESCRIPTORS: *Management engineering, Costs, *Operations research, *Scheduling, *Distribution, Economics, Probability.

A number of management planning problems are examined in their chance-constrained formulations. These include an expected value, or E objective; a variance, or V objective; and a probability, or P objective. This will help to demarcate boundaries and directions of further exploration.

PB 158 592 $3.60

Northwestern Technological Inst., Evanston, Ill.
TOWARD A UNIFIED THEORY OF PRODUCTION AND LOCATION, by Mitchell Harwitz. Rept. on Temporal Planning and Management Decision under Risk and Uncertainty, Contract Nonr-1228(10). Dec 60, 34p. 13 refs. O.N.R. Research memo. no. 38; AD-250 814.

DESCRIPTORS: Management engineering, Theory, *Operations research, Mathematical analysis, *Industrial production, Industrial plants, Economics, *Costs.

MATERIALS

PB 158 661 $2.60

Florida U., Gainesville.
[SYNTHESIS OF STRONG OXIDIZERS] by J. Archambault and W. D. Foucher, Jr. Annual status rept. 1, 1 Oct 59-30 Sep 60, on Contract Nonr-580(08). 30 Dec 60, 21p. 14 refs. AD-251 001.

DESCRIPTORS: *Oxidizers, *Rocket oxidizers, Synthesis, Metallic compounds, *Nitrates, Tetroxides, Nitrogen compounds, Solubility, Complex compounds, Perchlorates, Determination, Alkali metal compounds.

The synthesis of light metal nitrates as possible strong oxidizers with low oxidation equivalent weights was undertaken. Complexes of these nitrates having ligands of relatively low molecular weight were emphasized. Synthesis of such complexes of Li and Mg nitrates was attempted by reactions of liquid dinitrogen tetroxide with various Li and Mg compounds. The formation of dinitrogen tetroxide adducts of these metal nitrates was studied. The solubilities of KC104 and NAC104 at 30 C were determined in the mixed solvent H20-H20 as a function of solvent composition; ternary phase diagrams were constructed for these systems.

PB 181 087 $2.75

[Institute of Science and Tech.] U. of Michigan, Ann Arbor.
OPTICAL MATERIALS FOR INFRARED INSTRUMENTATION, by Stanley S. Ballard, Kathryn A. McCarthy, and William L. Wolfe. Rept. on IRIA State-of-the-Art, Contract Nonr-1224(12). Jan 59, 121p. 35 refs. Rept. no. 2389-11-S; AD-217 367.

DESCRIPTORS: *Infrared optical materials, Instrumentation, *Optical materials, Optical instruments, Refractive index, Optical glass, Crystals, Ceramic materials, Optics, Infrared equipment, Physical properties, Electrical properties, Mechanical properties, Materials.

The properties of approximately fifty materials which are useful in optical instrumentation in the infrared portion of the electromagnetic spectrum are described and compared. Each material is discussed in detail in terms of its optical, chemical, thermal and mechanical properties. Tables and figures are given so that the properties of the various materials can be readily compared. (Author)

AD-257 867 repriced $2.25

Lockheed Aircraft Corp., Sunnyvale Calif.
BIBLIOGRAPHY AND TECHNICAL REVIEW OF RUTILE (TiO_2), by Lewis E. Hollander, Jr. and Patricia L. Castro. Technical rept. on Communication. Mar 61, 93p. 259 refs. LMSD-894803.

DESCRIPTORS: *Titanium compounds, Patents, *Dioxides, *Bibliography, Single crystals, Crystal structure, Oxidation, Dielectrics, Reduction, Electrical properties, Resonance, Microwave amplifiers, Films, Masers

Contents:
Crystal growth and preparation techniques
Crystal structure
Oxidation and reduction studies of the titanium-oxygen system
Dielectric properties
Electrical properties
Resonance, Maser, and microwave effects
Elastic moduli
Films
Suboxides of titanium
General survey papers
Patents utilizing the oxides of titanium for electronic applications

PB 150 729 $1.60

Rock Island Arsenal Lab., Ill.
A RADIOMETRIC METHOD FOR DETERMINING THE VOLATILE LOSS AND MIGRATION OF ORGANIC ADDITIVES IN VULCANIZATES, by W. Dennis McHenry. 14 Sep 60, 17p. 10 refs. Rept. no. 60-2713; AD-250 818.

DESCRIPTORS: *Vulcanizates, Organic compounds, *Tracer studies, Radiometers, Additives, Inhibition, Stability, Elastomers, Test methods, Evaporation, Vaporization, Fatty acid ester, Soaps, Antioxidants, Radioactive isotopes, Scintillation counters, Metal-organic compounds

A radiometric method for determining the volatile loss and migration of organic additives in SBR vulcanizates is given. The concentration of tritium tagged additives at various depths in the specimen is determined by abrading particles from the vulcanizate and determining their radioactivity by the use of suspension scintillation counting techniques. Sample preparation is discussed in detail and results are given which indicate that the average loss of pentaerythritol during air oven aging was 57.7 and 40.8% when used alone and in conjunction with a mixture of Cd/Ba fatty acid soaps, respectively. The corresponding losses of the soaps were 68.9 and 70.8%. It is also noted that the loss of pentaerythritol at the surface was 67.3 and 23.5% with and without the soaps, respectively. (Author)

Ceramics and Refractories

AD-259 754 $4.60

Armour Research Foundation, Chicago, Ill.
INVESTIGATION OF GLASS FIBER STRENGTH ENHANCEMENT THROUGH BUNDLE DRAWING, by N. A. Weil, J. S. Islinger and others. Quarterly rept. no. 1, 6 Jan-6 Apr 61 on Contract NOw-61-0259-c. May 61, 49p. 39 refs. ARF Proj. K213.

DESCRIPTORS: *Glass textiles, *Drawing (Machine processing), Tensile properties, Fibers, Theory, Manufacturing methods, Industrial equipment.

Attempts were initiated to develop methods capable of producing glass fibers on a production quantity basis having a strength of about 550,000 to 600,000 psi. Materials to be used for the fibers will be various glasses such as E glass and other high strength, high modulus glasses in rod form. The strength enchancement of the glass is to be achieved by means of: (1) a bundle drawing method whereby a great number of glass strands are embedded into a matrix, surrounding the whole bundle with a glass tube and drawing the resulting bundle as a single unit; and (2) a flaw-arrest mechanism brought about by suitable coating procedures. A rod drawing system was designed to meet the special requirements necessary to obtain a fiber of only several microns in diameter and to maintain its uniformity. The coating materials being investigated are low melting metals. The matrix and sheathing materials are expected to be metal and glass.

NAA-SR-6420 $0.50

Atomics International, Canoga Park, Calif.
BERYLLIUM OXIDE SINGLE CRYSTAL GROWTH. II. WATER VAPOR TRANSPORT METHOD, by S. B. Austerman and A. R. Hopkins. Rept. on Contract AT(11-1)-GEN-8. Nov 61, 19p.

NAA-SR-6453 $0.50

Atomics International, Canoga Park, Calif.
SEMI-CONTINUOUS HOT PRESSING, by J. D. McClelland and E. H. Zehms. Rept. on Contract AT(11-1)-GEN-8. Nov 61, 14p.

PB 159 104 $2.60

Bjorksten Research Labs., Inc., Madison, Wis.
HIGH VISCOSITY REFRACTORY FIBERS, by Stanley A. Dunn and William P. Roth. Quarterly rept. no. 1, 20 Oct 59-20 Jan 60 on Contract NOrd-19100. 22p. 2 refs; AD-233 769

DESCRIPTORS: *Refractory materials, Ceramic materials, *Ceramic fibers, Glass, Viscosity, Additives, Ablation.

The objective is to search for and develop high viscosity, high melting fibers for reinforcement of thermal protection materials to be used in high performance guided missile propulsion systems. Considerable effort is to be directed to obtaining viscosity data on materials studied. A survey was made of the classes of chemical compounds which, dispersed as fine particles in a vitreous material, might serve to increase its viscosity. A simple relative viscosity measuring device, a form of penetrometer, was constructed and preliminary measurements were made. These measurements indicate that the viscosity of Owens-Corning "C" glass may be raised by dispersion of finely divided insoluble refractories. An alpha-rod ablation test setup is being constructed and is now nearly completed. (Author)

ORNL-3183 $0.50

Oak Ridge National Lab., Tenn.
THE CALCINATION IN AIR OF BERYLLIUM OXALATE TRIHYDRATE TO BERYLLIUM OXIDE, by R. L. Hamner and L. A. Harris. Rept. on Contract W-7405-eng-26. 13p.

TID-7602(Pt. 1) (Rev.) $0.75

Oak Ridge National Lab., Tenn.
PROCEEDINGS OF THE BERYLLIUM OXIDE MEETING, held at Oak Ridge National Laboratory, Oak Ridge, Tennessee 1-2 December 1960. 40p.

Leather and Textiles

OTS SB-481 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
TEXTILE FABRICS AND RELATED RESEARCH. Sep 61, 30p. 401 refs. OTS Selective Bibliography SB-481.

DESCRIPTORS: *Textiles, Cotton textiles, Woolen textiles, Rayon fibers, Nylon, Orlon, Dacron, Parachute fabrics, Elastic webbing, Dyes, Finishes, Processing, Machines, *Bibliography

Lists 401 domestic and foreign reports added to the OTS collection during the period 1950 to October 1961. Reports are separated into categories of fabrics, general; specific fabrics, like cotton, wool, rayon, nylon, orlon, and dacron; parachute fabrics and webbing; textile finishes (fungus, fire, oil, water and crease resistant); dyes; textile machinery; and Government-owned patents. Research covers such subjects as geometry of fabrics, thermal stability and high-temperature fabrics, antistatic agents, fabric blends, surface testing, ultrasonic washing of wool, orlon felt in glass-reinforced laminates, impact testing of parachute fabrics and webbing, textile machinery, and other related material.

OTS SB-480 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
TEXTILE FIBERS. Sep 61, 25p. 347 refs. OTS Selective Bibliography SB-480.

DESCRIPTORS: *Textiles, *Synthetic fibers, *Threads, *Cordage, Fibers, *Bibliography, Patents.

Lists 347 domestic and foreign reports on natural and synthetic fibers; threads and yarns; cordage and hard fibers added to the OTS collection during the period 1950 to October 1961. Covers research on fiber blends, chemical identification of fibers, fatigue testing, high speed spinning, fiber dyeing, thermal stability, several new foreign fibers, non-woven materials, and Government-owned patents.

Plastics

AD-263 271 repriced $2.50

Lockheed Aircraft Corp., Sunnyvale, Calif.
REINFORCED PLASTICS FOR PRESSURE VESSELS AND ROCKET MOTOR CASES. AN ANNOTATED BIBLIOGRAPHY, by A. A. Beltran. June 61, 120p. 231 refs. Special Bibliography SB-61-32; 5-73-61-3.

DESCRIPTORS: *Bibliography, *Filament-wound construction, Wire winding machines, *Rocket cases, *Pressure vessels, Fibers, Plastics, Laminates, *Reinforcing materials, Physical properties, Mechanical properties, Industrial equipment, Production, Test methods, Non-destructive testing, Quality control.

This annotated bibliography presents the literature on the applications of filament wound structures to rockets and missiles. It covers development of fibers; filament winding methods and equipment; testing and quality control; the mechanical and physical properties of reinforced plastics; and their applications to rocket motor cases and other propulsion system components. (Author)

PB 157 333 $2.60

Massachusetts U., Amherst.
THE RELATIVE ORIENTATION OF CRYSTALLINE AND AMORPHOUS REGIONS IN POLYETHYLENE, by Richard S. Stein and Donald G. LeGrand. Technical rept. no. 25 on Contract Nonr-2151(00). 1 Sep 60, 29p 36 refs. AD-247 752.

DESCRIPTORS: *Polymers, *Ethylenes, Films, *Crystals, Growth, Temperature, Crystal structure.

It is proposed that while there is no average orientation of either crystalline or amorphous regions in an unoriented polyethylene film, there exist domains within which there is preferred orientation of the crystallites in a particular direction, and of the amorphous regions in a direction perpendicular to that of the crystallites. Evidence for the existence of these regions is obtained (a) from light scattering studies on polyethylene films, (b) by infrared dichroism and birefringence studies of orientational changes of crystalline and amorphous regions during drawing of polyethylene, (c) in studies of orientation of polyethylene crystals growing from oriented amorphous material, (d) from observations of orientational changes occurring during annealing of drawn polyethylene films and, (e) from observations of spherulitic birefringence. (Author)

PB 159 088 $1.10

Naval Ordnance Lab., White Oak, Md.
POLYETHYLENES AND RELATED SUBSTANCES; RESISTANCE OF TO THE GROWTH OF FUNGI (PROJECT P-30), by Dorothea E. Klemme and G. M. Watkins. 14 Feb 50, 8p. 5 refs. Naval Ordnance Lab. memo. 10726.

DESCRIPTORS: *Polymers, *Ethylenes, *Butenes, *Resins, *Fungi, Growth, *Mildew, Resistance, Tests, Molecular weight, Plastics.

Sixteen polyethylene resins ranging approximately in molecular weight from 1,000 to 28,000, two polyisobutylenes, two samples of polytrifluorochloroethylene and three cellulose derivatives were tested for (a) ability to support fungus growth without supplementary source of nutrients, (b) ability to serve as a source of carbon when adequate mineral salts are furnished and (c) fungistatic activity. The organisms selected for this investigation were Aspergillus niger, A. flavus, Penicillium luteum and Trichoderma T-1. An in vitro test method involving the use of cleaned quartz sand as a supporting material was developed and employed in these tests.

MATHEMATICS

PB 158 437 $5.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
THE BOUNDARY VALUES OF ANALYTIC AND HARMONIC FUNCTIONS, by H. L. Royden. Technical rept. no. 19 on Contract DA 04-200-ORD-704. 2 Nov 60, 52p. 19 refs. AROD rept. no. 1323:20M; AD-247 201.

DESCRIPTORS: *Functions, *Complex variables, Algebra, Theory

Proof and applications are presented of the following theorem for integrable as well as continuous f: Let W be a finite Riemann surface with boundary (or border) T. If f is a continuous function defined on T such that the integral of fA over T is equal to zero for all analytic differentials A on W which are regular on T, then f can be extended to be analytic function on W. Boundary values for harmonic and analytic functions belonging to the Hardy class are introduced for annular regions in the plane and used to discuss the general finite Riemann surface case. These results are applied to the dual extremal problems and used to give a new proof of a theorem on the maximality of certain function algebras. A fragment of this theory is established for non-compact bordered Riemann surfaces.

PB 158 583 $5.60

Applied Mathematics and Statistics Labs., Stanford U., Calif.
THE NON-UNIQUENESS OF THE CAUCHY PROBLEM, by Paul J. Cohen. Technical rept. no. 93 on Contract Nonr-225(11). 30 Dec 60, 53p. 10 refs. AD-248 940.

DESCRIPTORS: *Partial differential equations, Polynomials, Differential equations, Theory, Operators (Mathematics), Equations.

A systematic treatment of the phenomenon of non-uniqueness of the Cauchy problem is given. A proof is given that non-uniqueness must always hold when certain conditions are violated. For elliptic equations the degree of continuity which can be obtained is described exactly. Also presented is a new type of non-uniqueness which does not depend upon multiplicity of the characteristics, but upon the fact that the co-efficients of the principal part are not real. (Author)

ANL-6453 $1.50

Argonne National Lab., Ill.
APPLIED MATHEMATICS DIVISION. Summary rept. 1 July 60-30 June 61, on Contract W-31-109-eng-38. 65p.

TID-3568 $0.50

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
CRITICAL PATH SCHEDULING, comp. by Hugh E. Voress, Elmer A. Houser, Jr. and Fred E. Marsh, Jr. A preliminary literature search. Oct 61, 28p. 255 refs.

AD-259 868 $11.00

Electronics Research Lab., U. of California, Berkeley.
A STUDY OF SHORT-TIME CORRELATION AND ITS APPLICATION OF SYSTEM PARAMETER EVALUATION, by M. Iwama. Thesis. 13 Apr 61, 148p. 14 refs. IER Series no. 60, Issue no. 354.

DESCRIPTORS: Correlation techniques, Differential equations, Statistical processes, Measure theory, *Functions, Functional analysis, *Control systems, Probability, Analog computers, Signals, Statistical functions, Mathematical analysis

A technique for evaluating the parameters of a system having a differential equation with slowly time-varying coefficients is developed. Parameters are evaluated from the measured input and output of the system operating in its normal mode. The statistical processes related to short time correlation coefficients between such functions are investigated. Based on the results of these studies, two variations of the proposed parameter evaluation technique - the short time correlation and the modified short time correlation methods - are developed. Analytical studies and analog computer studies show conclusively that the proposed parameter evaluation technique is practical as well as theoretically sound. In particular, the modified short time correlation method is relatively easy to mechanize, and can be readily applied to many current problems in control system technology.

NYO-9497 $2.60

Institute of Mathematical Sciences, New York U., N. Y.
ITERATION METHODS FOR NON-LINEAR PROBLEMS, by Samuel Schechter. Rept. on Contract AT(30-1)-1480. May 61, 21p.

PB 157 426 $3.60

Institute of Statistics, U. of North Carolina, Chapel Hill.
CONSISTENCY OF PARAMETER-ESTIMATES IN A LINEAR TIME-SERIES MODEL, by Friedhelm Eicker. Rept. on Contract Nonr-855(06). Oct 60, 37p. 13 refs. Mimeograph series no. 265; AD-248 658.

DESCRIPTORS: *Statistical analysis, *Series, Matrix algebra, Least square method.

The basic conditions under which consistency in a time series analysis can be assured are stated. Some narrower conditions are derived from these, which may be easier to verify in some applications. These conditions show the existence of consistent least squares estimates also for some exponentially increasing regression vectors. Applications are made to polymonial, exponential, and trigonometric regression. (Author)

PB 158 622 $1.10

New York State Coll. of Agriculture, Cornell U., Ithaca, N. Y.
SOME REMARKS ON THE USE OF MOMENT ESTIMATORS FOR THE PARAMETERS OF A MIXTURE OF TWO BINOMIAL DISTRIBUTIONS, by Wallace R. Blischke. Technical rept. no. 2 on Contract Nonr-401(39). Dec 60, 9p. 3 refs. AD-250 160.

DESCRIPTORS: *Binomials, Statistical distributions, Analysis of variance.

AD-259 502 $2.60

Northwestern U., Evanston, Ill.
CONTINUED FRACTION SOLUTIONS OF THE RICCATI EQUATION, by E. P. Merkes (Marquette U.) and W. T. Scott. Technical note no. 3 on Contract AF 49(638)888. June 61, 22p. 18 refs. AFOSR-903.

DESCRIPTORS: *Continued fractions, *Differential equations, Taylor's series, Series, Transformations (Mathematics), Functions, Sequences.

Attention is confined to the general Riccati differential equation with a singular point at the origin, The Riccati differential equation has the formal property that a linear fractional transformation yields a new Riccati differential equation in a new dependent variable. An obvious connection with continued fractions arises from the fact that a continued fraction may be interpreted as a sequence of linear fractional transformations. Attention is focused on those linear fractional transformations which generate a continued fraction.

AD-259 509 $1.10

Northwestern U., Evanston, Ill.
A STARLIKE INFINITE PRODUCT, by E. P. Merkes (Marquette U.) and W. T. Scott. Technical note no. 2 on Contract AF 49(638)888. June 61, 3p. 4 refs. AFOSR-902.

DESCRIPTORS: Functions, Sequences, *Conformal mapping, Complex numbers.

SC-4643(M) $1.50

Sandia Corp., Albuquerque, N. Mex.
PRELIMINARY MANUAL FOR QUIKOD. A PROGRAMMING SYSTEM FOR THE IBM 709/7090 DATA PROCESSING MACHINES, by L. E. West. Dec 61, 62p.

PB 158 671 $3.60

Washington U., Seattle:
ESSENTIAL CHARACTERISTICS AND SPECIAL CASES OF MULTIVARIATE ANALYSIS DESIGNS, by Paul Horst. Rept. on Contract Nonr-477(08) and Public Health Research Grant M-743(C5). Dec 60, 40p. 17 refs. AD-250 095.

DESCRIPTORS: *Analysis of variance, Design, *Combinatorial analysis, Statistical analysis, Experimental data, Matrix algebra.

A set of characteristics are considered in terms of which most multivariate designs may be described, and then special cases in terms of these characteristics are discussed. Only incidentally special areas of applications are stressed. The discussion is presented in such a way as to develop a list of multivariate experimental designs and the aptness of each for particular areas of research. (Author)

Computing Devices

PB 158 170 $16.50

Computation Lab., Harvard U., Cambridge, Mass.
EFFICIENT ERROR-LIMITING VARIABLE-LENGTH CODES, by Peter Gabriel Neumann. Doctoral thesis. Rept. on Theory of Switching to Bell Telephone Labs. 1 May 61, 260p. 40 refs. Rept. no. BL-28.

DESCRIPTORS: *Communication systems, Information theory, *Data transmission systems, Data, *Coding, Errors, Switching circuits, Theory, *Digital computer

A class of variable-length codes defined by sequential machines is presented. By virtue of their systematic construction, these codes are inherently stable under errors. For large systems, particularly for natural languages, these codes permit a redundancy surprisingly close to the minimum. (See also PB 158 169)

PB 158 167 $4.60

Computation Lab., Harvard U., Cambridge, Mass.
LOGICAL DESIGNS FOR ARITHMETIC UNITS, by Derek S. Henderson. Doctoral thesis. Rept. on Theory of Switching to Bell Telephone Labs. 1 May 60, 48p. 30 refs. Rept. no. BL-25.

DESCRIPTORS: *Digital computers, Computers, Design, *Computer logic, *Switching circuits, Theory, Numerical methods and procedures

In this thesis methods are proposed for the logical design of various types of arithmetic units for high-speed digital computers. Except where expressly indicated, attention is confined to binary systems. The

design of general and special purpose counters is discussed. Two main types of adders are developed, and special comparator circuitry for use in sorting operations is described. An analysis of maximum carry propagation lengths for various radices is provided. Finally, the question of the simultaneous addition of several numbers receives attention. The carry storage adder is applied to a shortcut method of multiplication. Various proposals for performing the operations of division and square root extraction are discussed. The residue class number system is discussed. Methods based on modular arithmetic are derived for detecting and correcting errors in the arithmetic operations of both radix and residue class systems. Comparisons and conclusions are drawn from the material of the thesis, and areas in which further research is likely to be profitable are suggested. (See also PB 158 166)

PB 158 171 $15.50

Computation Lab., Harvard U., Cambridge, Mass. MAGNETIC DEVICES IN SAMPLED ANALOG SYSTEMS, by Andrew James Lincoln. Doctoral thesis. Rept. on Theory of Switching to Bell Telephone Labs. 31 May 61, 235p. 24 refs. Rept. no. BL-29.

DESCRIPTORS: *Analog computers, Computers, Control systems, *Magnetic cores, Magnetic core switches, *Switching circuits, Data storage systems, Design, Sampling, Hysteresis, Operation, Diodes, Transistors, Circuits

The response of physical systems to controlling signals may often be improved by the insertion into the control loop of controllers capable of performing linear difference operations upon sampled system variables. It is shown how rectangular hysteresis loop magnetic cores possess analog storage properties which may be employed in the formation of such sampled-data controllers. (See also PB 158 170)

PB 158 169 $12.00

Computation Lab., Harvard U., Cambridge, Mass. SWITCHING FUNCTION CANONICAL FORMS OVER INTEGER FIELDS, by Martin Cohn. Doctoral thesis. Rept. on Theory of Switching to Bell Telephone Labs. 31 Dec 60, 161p. 58 refs. Rept. no. BL-27.

DESCRIPTORS: *Digital computers, Computers, *Switching circuits, Functions, Transformations (Mathematics), Numbers, Algebras, *Computer logic, Matrix algebra, Tensor analysis, Algebra, Numerical methods and procedures

A class of canonical forms of switching function is investigated. Functions in these forms are expressed in terms of the operations of addition and multiplication as defined over finite fields of integers. Techniques are developed for deriving economical canonical form expressions and for manipulating the matrices which interrelate the various forms. (See also PB 158 168)

PB 158 166 $13.50

Computation Lab., Harvard U., Cambridge, Mass. THEORY OF SWITCHING, by Howard Aiken. Rept. to Bell Telephone Labs. 1 Dec 59, 196p. 35 refs. Rept. no. BL-24.

DESCRIPTORS: *Digital computers, Computers, *Switching circuits, Circuits, *Machine translation, *Computer logic, Algebras, Functional analysis, Transformations (Mathematics), *Control systems, *Analog computer, Sampling, Numerical methods and procedures, Design

Contents:
Section 1. The automatic translation of machine shorthand: a study of the theory, by Gerard Salton
Section 2. A proposed design of a disk-drum device for general purpose function analysis, by Norman Solomon and John Roche
Section 3. Preface to papers on sampled-data systems, by Albert L. Hopkins, Jr.
Section 4. Magnetic analog sampling computer circuits, by A. James Lincoln
Section 5. A root modulus criterion for z-transforms, by Albert L. Hopkins, Jr.
Section 6. An efficient algorithm for binary division, by Derek Henderson
(See also PB 136 335, PB 147 349)

PB 158 168 $12.00

Computation Lab., Harvard U., Cambridge, Mass. THEORY OF SWITCHING, by Howard Aiken. Rept. to Bell Telephone Labs. 1 Dec 60, 165p. 49 refs. Rept. no. BL-26.

DESCRIPTORS: *Digital computers, Computers, *Switching circuits, Circuits, Theory, *Computer logic, Algebras, Algebra, *Machine translation, Matrix algebra, Tensor analysis, Transformations (Mathematics).

Contents:
Section 1. Switching function canonical forms based on commutative and associative binary operations, by Peter Calingaert
Section 2. Description of a multi-purpose switching circuit, by Albert L. Hopkins, Jr.
Section 3. E-algebras in switching theory, by Warren L. Semon
Section 4. The use of syntactic analysis in the automatic transcription of machine shorthand, by Gerard Salton
Section 5. Two-dimensional parity checking, by Peter Calingaert
(See also PB 158 167)

PB 155 587 $3.60

Electronic Defense Labs., Mountain View, Calif. AN ELECTRONIC STANDARD DEVIATION COMPUTER, by C. I. Beard and J. L. Kulp. Rept. on Contract DA 36-039-sc-87475. 2 Jan 61, 35p. 16 refs. Technical memo. no. EDL-M282; AD-251 175.

DESCRIPTORS: *Analog computers, Standards, Statistical processes, *Detectors.

An all-electronic standard deviation computer was built to decrease the time required to reduce statistically fluctuating signals; i. e., it replaces the graphical and numerical procedures which are usually applied to long chart records of instantaneous signals. The computer will accept signals whose frequency spectra extend from 0 to above 250 cps. The computing accuracy of this device is 0. 1% for signals of less than 5 cps (on the order of the accuracy of servo

computers); for an 80 cps sinusoidal input, the error in the square of the standard deviation is 1%. (Author)

PB 157 812 $1.60

Hermes Electronics Co., Cambridge, Mass.
THE PARAMETRON USED AS A MAJORITY GATE FOR IMPROVING DIGITAL SYSTEM RELIABILITY, by Donald Sims. Rept. on Contract Nonr-2133(00). [1960]. 19p. 2 refs. AD-244 488.

DESCRIPTORS: *Digital systems, Reliability, Circuits, Memory devices, Digital computers.

A number of simple logical circuits were presented to illustrate logical design principles with Parametrons. The Parametron element was tested under many logical configuration and the conclusion was that n number of logical configurations are available to the logical designer and are practically limited only by this ingenuity. Using the basic design concepts of the Parametron logic element, the majority logic was applied to a full parallel adder. The majority logic adder was tested under a number of simulated failure conditions in which one-third of the majority gate elements was inactive. The adder operated under such failures as shorted inputs, shorted outputs, and open output windings. The tests are not adequate to come to any definite reliability conclusion, but the results were encouraging. The Parametron is a very economical element which employs only passive components. Only one standard type module is employed for all applications in digital logic. The use of majority logic is easy to employ and logic modifications can be done simply through simple accessible wiring changes. (Author)

PB 158 573 $1.10

Princeton U., N. J.
RESEARCH ON DIGITAL COMPUTER LANGUAGE PROBLEMS, by Forman S. Acton. Final rept. on Contract Nonr-1858(22). 1 Dec 60, 7p. AD-250 303.

DESCRIPTORS: *Digital computers, *Language, *Programming, Coding, Machine translation.

A major accomplishment has been the production of a generalized language translator which is independent of the external language it is translating. The generalized translator has been instrumented as a compiler for the language known as ALGOL-60.

PB 157 376 $1.60

Princeton U., N. J.
A SYNTAX DIRECTED COMPILER FOR ALGOL-60, by Edgar T. Irons. Rept. on Contract Nonr-1858(22). 13 Oct 60, 16p. AD-248 458.

DESCRIPTORS: *Computers, Language, Coding, *Machine translation.

A compiling system is described which essentially separates the functions of defining the language and translating it into another. Part 1 presents the metalanguage used to define the object language in terms of the target language. This meta-language is an extension of the syntax meta-language used in the ALGOL 60 report which allows specification of meaning (in terms of the target language) as well as of form. This succinct definition allows modifications to the form or meaning of the object language to be incorporated easily into the system, and in fact makes the original specification of the object language a reasonably easy task. Part 2 is a description of the program which utilizes a direct machine representation of the metalinquistic specifications to effect a translation. (Author)

PB 157 345 $3.60

Rensselaer Polytechnic Inst., Troy, N. Y.
A COMPUTER PROGRAM FOR A CLASS OF NETWORK-TYPE OPTIMIZATION PROBLEMS, by C. E. Lemke and T. J. Powers. Rept. on Contracts Nonr-591(13) and Nonr-1228(10). 28 Sep 60, 35p. 12 refs. RPI MathRep no. 36; AD-248 987.

DESCRIPTORS: *Scheduling, Simulation, Digital computers, *Programming, Costs, *Operations research, Computers.

An IBM-650 computer program is described for solving a certain type of network-like linear programming problem slightly more general than the classical transportation problem; namely that where the network, nodal inputs and outputs, and (constant) costs per unit flow on the branches is specified, and where the problem is to determine a set of branch flows which minimizes the cost of flow through the network. Included are a description of the computer program, with charts, and a small completed example. The program accommodates networks with up to 100 nodes. (Author)

MECHANICS

Aerodynamics and Pneumatics

PB 158 565 $1.10

Brown U. Div. of Applied Mathematics, Providence, R. I.
FURTHER NOTE ON AIRFOIL THEORY IN HYDROMAGNETICS, by G. S. S. Ludford. Technical rept. no. 39 on Contract Nonr-562(07). Dec 60, 6p. 3 refs. AD-248 135.

DESCRIPTORS: *Magnetohydrodynamics, *Airfoils, Theory, Lift, Mathematical analysis.

The previous note was concerned with the lift loading on a thin airfoil moving at right angles to an applied magnetic field in a fluid of infinite electrical conductivity. The object of this sequel is to point out that the three basic integrals which were there expressed in terms of hypergeometric functions are in fact simple algebraic functions; and to show that this leads to results comparable in simplicity to those in ordinary airfoil theory. (Author)

PB 158 125-1 $11.00

Cleveland Pneumatic Industries, Inc., Bethesda, Md.
FUNDAMENTALS OF THE STABILITY OF PERIPHERAL JET VEHICLES. VOLUME ONE. ELEMENTARY PRINCIPLES, by Michael C. Eames. Rept. on Contract Nonr-3179(00). Nov 60, 148p. 2 refs. AD-248 530.

DESCRIPTORS: Stability, Jets, Control, *Ground effect, Dynamics, *Vehicles, Lift, Theory.

The dynamic behavior of a peripheral jet machine in heave and pitch, or in heave and roll is discussed. Results are restricted to two-dimensional models at slow forward speeds, but the theory covers various forms of compartmentation, effects of jet thickness and constant total-head, effects of viscous mixing and in a preliminary way, operation over water. Explicit expressions are presented whenever possible for natural frequencies, damping coefficients, magnification factors, etc., in terms of simple machine parameters. (Author)

PB 158 125-2 $12.50

Cleveland Pneumatic Industries, Inc., Bethesda, Md.
FUNDAMENTALS OF THE STABILITY OF PERIPHERAL JET VEHICLES. VOLUME TWO. FUTHER CONSIDERATIONS, by Michael C. Eames. Rept. on Contract Nonr-3179(00). Nov 60, 176p. 3 refs. AD-248 531.

DESCRIPTORS: Stability, Jets, Control, *Ground effect, Dynamics, *Vehicles, Lift, Theory.

Contents:
Heaving and pitching motion
Effect of a central jet
Effect of double jets
Effect of forward speed
Effect of jet mixing
Effect of momentum variation and jet thickness
Jet behaviour over water
Heaving and pitching over water (See also PB 158 125-1)

PB 158 125-3 $10.10

Cleveland Pneumatic Industries, Inc., Bethesda, Md.
FUNDAMENTALS OF THE STABILITY OF PERIPHERAL JET VEHICLES. VOLUME THREE. APPENDICES, by Philip D. Fisher, Shan-Fu Shen, and John R. Weske. Rept. on Contract Nonr-3179(00). Nov 60, 126p. 14 refs. AD-248 532.

DESCRIPTORS: Stability, Jets, Control, *Ground effect, Dynamics, *Vehicles, Lift, Theory.

Contents:
Harmonic linearization of equations of motion
Effect of jet mixing on peripheral jet vehicles
Effect of cushion vortices on peripheral jet vehicles
Unbalanced operation of peripheral jets over water
Response of the water surface (See also PB 158 125-2)

PB 158 594 $3.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
NONSTEADY SUPERCRITICAL DISCHARGE THROUGH AN ORIFICE, by George Rudinger. Rept. on Contract Nonr-1858(25). Dec 60, 34p. 14 refs. Proj. Squid Technical rept. CAL-82-P; AD-250 107.

DESCRIPTORS: Shock tubes, *Shock waves, Gas flow, Pressure, *Orifices, Reflection, Boundary layer, Photographic analysis, Schlieren photography.

Previous studies of shock reflection from open-ended duct configurations indicate that a steady discharge is not instantaneously formed and that the effects of this lag may occasionally be important. A theory is available which satisfactorily describes the lag effects in subcritical flow, but its validity for super-critical flow was not previously verified. Shock-tube experiments are carried out to study the lag effects in supercritical flow from a sharp-edged orifice. The incident shock wave either modifies an initial supercritical discharge, or establishes such a discharge with the gas initially being at rest. Schlieren photographs show a violent transition of the flow downstream of the orifice that lasts several msec. Pressure records taken inside the duct indicate a small, but distinct, pressure rise that also lasts for several msec following the passage of the reflected shock wave. This apparent agreement of the transition times is accidental. A method is described to evaluate the effect of boundary-layer growth on the pressure behind the reflected shock wave, and the results indicate that the entire observed pressure rise is accounted for by this effect. Consequently, flow adjustment in the orifice may be considered as instantaneous for all practical purposes. (Author)

AD-260 026 $3.60

Douglas Aircraft Co., Inc., Santa Monica, Calif.
A FLOW MODEL FOR HYPERSONIC RAREFIED GASDYNAMICS WITH APPLICATIONS TO SHOCK STRUCTURE AND SPHERE DRAG, by Nicholas Rott. 12 May 61, 39p. 9 refs. Douglas rept. SM-38524.

DESCRIPTORS: *Superaerodynamics, *Hypersonic flow, Shock waves, Spheres, Blunt bodies, Shear stresses, Drag, Mathematical analysis

A flow model is proposed for the hypersonic rarefied gas dynamics regime which is intermediate between free molecule flow and continuum fluid dynamics. The model is based on the concept of a two-component fluid, one of which is treated as a molecular beam, while the other component is treated as a continuum fluid. The interaction between the two components is a collision mechanism, whereby the first fluid is transformed into the second fluid. Only the essential features and a few simple applications of the model are presented. The model is applied to the description of shock wave structure and to the hypersonic drag problem for a sphere in the intermediate flow regime. The shock structure is found to be in very good agreement with previous analyses. The drag of the sphere is in qualitative agreement with experimental results, and some success in quantitative comparison is also realized. (Author)

AD-260 027 $7.60

Douglas Aircraft Co., Inc., Santa Monica, Calif.
ONE-DIMENSIONAL FLOW OF DISSOCIATED DIATOMIC GASES, by G. R. Inger. 2 May 61, 72p. 13 refs. Douglas rept. SM-38523.

DESCRIPTORS: *Compressible flow, *Gas flow, Gases Dissociation, Algebra, Specific heat, *Hypersonic flow, Pressure, Temperature, *Thermodynamics, Enthalpy, Mathematical analysis, *Superaerodynamics

The object is to derive and interpret generalized forms of the algebraic one-dimensional compressible flow relations for a dissociated diatomic gas in either thermodynamic equilibrium or chemically frozen flow. These equations indicate the dissociation effects directly in terms of modifications of the usual isentropic relations and enable a physical appreciation for the comparative behavior of the two dissociation-chemistry extremes which serve as upper and lower bounds on any nonequilibrium behavior which may exist. A discussion of the efficacy of defining effective specific heats is given. Typical examples of both frozen and equilibrium dissociation effects on pressure ratio versus Mach number, temperature ratio versus Mach number, area ratio versus Mach number, and mass flow-throat area requirements are given as a function of reservoir dissociation level for a reservoir pressure of 10 atmospheres. Application of these generalized relations to both internal and external flow problems is discussed, and an approximate method for analyzing the intermediate nonequilibrium behavior in one-dimensional flow is outlined. (Author)

PB 157 377 $2.60

Frick Chemical Lab., Princeton U., N. J.
THE THICKNESS OF SHOCK AND DETONATION FRONTS AND ROTATIONAL RELAXATION AT HIGH TEMPERATURES, by K. Hansen, D. F. Hornig and others. Technical rept. no. 3 on Contract Nonr-1858(24). 14 Sep 60, 23p. 12 refs. AD-254 644.

DESCRIPTORS: *Shock waves, *Detonation waves, Thickness, Measurement, Optics, Reflection, *Detonation, Optical analysis, Argon, Gases, Hydrogen, Oxygen, High temperature research, Rotation, Relaxation time, Test methods, Partial differential equations, Mathematical analysis, Compressible flow.

Optical reflectivity measurements of shock thickness in Ar have been extended to much higher Mach numbers. Earlier shock thickness measurements at Mach numbers up to 1.55 were found to be in good agreement with Navier-Stokes theory. The present measurements show that this agreement becomes progressively less good as the Mach number increases. The shock thickness in Ar appears to reach a maximum at about M 3 on the basis of preliminary experiments conducted at M 4.99 where the observed thickness agrees with the bimodal model of Muckenfuss. The optical reflectivity method has also been applied to H-O detonations and strong shock fronts in pure O. These measurements suggest that rotational relaxation, which is known to be rapid at low temperatures, may become slow at high temperatures. It also appears that in detonation waves heating effects may extend into the region of the initial compression process. (Author) (See also PB 152 895)

PB 157 424 $7.60

Iowa Inst. of Hydraulic Research, Iowa City.
EXPERIMENTAL STUDIES OF AN ANNULAR JET, by Lawrence R. Mack and Joachim Malsy. Rept. on Contract Nonr-1509(03). Sep 60, 71p. 9 refs. AD-245 059.

DESCRIPTORS: *Jets, *Ground effect, Nozzles, Lift, Flying platforms.

Lift-augmentation factors were computed from pressure measurements on the base plate of an annular jet nozzle held stationary over land. A jet directed inwardly 30° from the vertical gave higher augmentations than 0° and 15° inclinations, no significant differences between the 0° and 15° inward discharge angles being noted. Over the range of exit gap widths tested, both the augmentation factor and the radial uniformity of the base-plate pressure distribution increased with increasing width of the annulus. A rigidly supported 7-in diam annular-jet nozzle discharging air vertically at three different rates through a 1/8-inch gap was towed at two altitudes and three speeds (including zero velocity) over initially quiescent water. In general, it was noted that all observed water-surface phenomena moved to the rear and became less pronounced in magnitude with increasing forward speed or with decreasing jet momentum flux. For all conditions of forward motion tested, pressures on the rear half of the base plate were larger than those on the front, thus giving rise to a "nose-down" pitching moment acting on the base of the nozzle. For the stationary runs the augmentation increased with decreasing jet momentum as predicted by Mack and Yen. For each combination of altitude and jet momentum flux, there appeared to be a forward speed for which the augmentation factor became a maximum, further increases in speed causing a reduction of augmentation from its peak value. (Author)

PB 157 516 $1.60

Iowa Inst. of Hydraulic Research, Iowa, City.
REANALYSIS OF BOUNDARY-LAYER DATA ON A FLAT PLATE, by L. Landweber. Rept. on Contract Nonr-1611(01). Oct 60, 17p. 17 refs. AD-245 541.

DESCRIPTORS: *Turbulent boundary layer, Shear stresses, Pitot tubes, Experimental data, Sheets.

PB 155 446 $1.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
STAGNATION POINT FLOW OF MAGNETIZED BLUNT BODY IN HYPERSONIC FLOW, by S. I. Pai (U. of Maryland) and E. T. Kornowski. Rept. on Contract AF 04(647)269. Mar 61, 17p. 4 refs. Technical Information Series R61SD037; AD-253 393.

DESCRIPTORS: *Blunt bodies, Magnetic fields, *Electromagnetic fields, *Hypersonic flow, Gas flow, *Magnetohydrodynamics, Analysis.

The flow field near the stagnation point of a magnetized blunt body in a hypersonic flow is analyzed. The problem is formulated such that both the effect due to the strength of the magnetic field and that due to the nature of the magnetic field are investigated. The axisymmetrical case is considered. Numerical examples for a uniform stream passing over a magnetized body of revolution under different magnetic fields are given. The influences on the detached shock distance and body pressure gradient by the strength and the nature of the magnetic field under various hypersonic flows are presented. In some cases, the nature of the magnetic field has considerable influence, while in other cases they are negligible.

PB 158 673 $4.60

Wichita U., Kansas.
SHROUDED PROPELLER INVESTIGATIONS: WIND TUNNEL TESTS OF A SHROUDED PROPELLER MODEL WITH AN ELLIPTICAL SHROUD EXIT, by Vernon O. Hoehne. Rept. on Contract Nonr-201(01). Dec 60, 48p. 5 refs. Engineering rept. no. 213-16; AD-248 804.

DESCRIPTORS: Aspect ratio, *Aerodynamics, Drag, Ducted fans, Lift, Power, Tests, Moments, Pressure, *Ring wings, Velocity, *Shrouded propellers, Wind tunnel models, Wings, Model tests.

Wind tunnel tests were made on a shrouded propeller model with a shroud whose cross-section changed from circular at the propeller plane to elliptical at the exit. The major axis of the ellipse was parallel to the model pitching axis. The transition from circular to elliptical cross-section was achieved with no change in cross-sectional areas so that this shroud can be considered as being non-diffused. A comparison model with a configuration identical to the above model except for a circular shroud exit was also tested. Performance of both models was measured throughout an advance ratio range from zero to roughly 2.5 at several blade pitch angles and at angles of attack to 90 degrees. A comparison of the performance of the two models indicates that the circular exit model is superior to the elliptical exit model. (Author)

Hydrodynamics, Hydraulics, and Hydrostatics

PB 158 042 $2.60

Cornell Aeronautical Lab., Inc., Buffalo, N. Y.
ON THE INVISCID STABILITY OF THE BOUNDARY LAYER ON A FLEXIBLE WALL, by W. J. Rae and F. K. Moore. Rept. on Contract Nonr-2653(00). Nov 60, 29p. 4 refs. Rept. no. AF-1285-A-5; AD-246 520.

DESCRIPTORS: *Boundary layer control, Hydrodynamics, Friction, *Fluid flow, Ship hulls, Fluid mechanics, Laminar boundary layer.

The stability of the laminar boundary layer over a resilient surface is treated in the inviscid approximation, using as a wall boundary condition that the streamwise and vertical velocities are proportional to one another. Such a boundary condition can be interpreted physically as representing a coupling between the pressure and the velocity fluctuations at the surface. Preliminary results from three methods of attack on the problem indicate that a significant improvement in stability might be achieved by proper choice of the constant of proportionality. (Author) (See also PB 149 328)

PB 155 033 $1.60

David Taylor Model Basin, Washington, D. C.
HYDRODYNAMIC CHARACTERISTICS OF A HIGH-SPEED DEPTH RECORDER DEVELOPED BY THE U. S. NAVY MINE DEFENSE LABORATORY, by Arthur P. Brisbane. Feb 61, 16p. 3 refs. Rept. 1502; AD-252 012.

DESCRIPTORS: *Hydrodynamics, Model tests, *Depth indicators, *Pressure gages, Errors, Transducers, Naval mines, Countermeasures, Towed bodies, *Recording devices, Stability.

Model tests were conducted to determine the hydrodynamic characteristics of a high-speed depth recorder developed by the US Navy Mine Defense Laboratory. The error in indicated depth due to dynamic pressure at the original orifice location was measured and the true static-pressure point on the housing was located. The drag coefficient was determined and dynamic stability of the body was observed to be satisfactory over the speed range from 0 to 30 kn. (Author)

METALLURGY

PB 154 824 $3.60

Aeronautical Engine Lab., Naval Air Material Center, Philadelphia, Pa.
HIGH STRENGTH REFRACTORY ALLOYS, by S. C. Fiorello. Phase A rept. on BUWEPS P.A. NAM-RAPP33001. 8 Feb 61, 31p. Rept. no. NAMC-AEL-1674.

DESCRIPTORS: *Heat resistant alloys, Metals, Mechanical properties, Niobium, Zinc coatings, High temperature research, Exhaust gases, Combustion, Aviation fuels, Exposure, Hydrogen, Propanes, Tests, Materials, Gas turbines, Alloys, Refractory materials, Simulation, Zirconium, Niobium alloys.

The materials tested were columbium with a zinc coating and columbium plus 2% zirconium with a zinc coating. Both materials were exposed to high temperature exhaust gases supplied from the combustion of various fuels (hydrogen, propane, and JP-4). The maximum temperature to which the zinc coated materials appeared to perform satisfactorily was: (1) less than 1800°F when exposed to the exhaust gas products of hydrogen, and (2) in the region of 2000 to 2200°F when exposed to the exhaust gas products of propane and JP-4 fuels. No advantage would be realized by the use of the materials tested in the turbine section of air breathing gas turbine engines, since the current turbine inlet hot spot temperatures are in the same range as the maximum useful temperature determined for these materials. (Author)

PB 155 909 $7.60

Aeronautical Materials Lab., Naval Air Material Center, Philadelphia, Pa.
EVALUATION OF TITANIUM METALS CORPORATION OF AMERICA Ti-8Al-1Mo-1V ALLOY, by Paul J. Soltis. Rept. for June 58-Aug 60. 24 Mar 61, 79p. 20 refs. Rept. no. NAMC-AML-1207.

DESCRIPTORS: *Titanium, *Titanium alloys, *Molybdenum alloys, *Vanadium alloys, *Aluminum alloys, Metal, Alloys, *Heat resistant alloys, Chemical analysis, Creep, Thermal stresses, Deformation, Microscopy, Electron microscopy, Plasticity, Fracture (Mechanics), Microstructure, Hydrogen, Mechanical properties, Phase studies.

A study was made of a "near alpha"-type alpha-beta titanium alloy, Ti-8Al-1Mo-1V, with particular attention being given to its creep and thermal stability characteristics. Creep resistance was found to increase with stress at 950°F and a maximum effect could be observed at 47,500 psi as an anomaly in minimum creep rate and total deformation curves. After a 500-hour exposure to 950°F with or without stress, tensile ductility decreased to slightly less than half its original value of 30% R. A., but the decrease was only one-third after longer exposure times in the order of thousands of hours. Extensive metallographic examination using light and electron microscopy failed to reveal any significant phase changes; detailed metallography is presented, however, illustrating the plastic and fracture behavior of the alloy during creep exposure and after thermal exposure, with and without stress. The unusual creep and stability behavior found in this alloy are attributed to the ordered α_2 structure previously found in the binary Ti-Al system in the range 6 to 8% of aluminum. The results suggest the possibility of a practical utilization of the ordered α_2 structure in this type alloy. Microstructural evidence indicates that hydrogen present to 100 ppm could adversely influence mechanical properties. (Author)

PB 154 738 $3.60

David Taylor Model Basin, Washington, D. C.
PLASTIC AXISYMMETRIC BUCKLING OF RING-STIFFENED CYLINDRICAL SHELLS FABRICATED FROM STRAIN-HARDENING MATERIALS AND SUBJECTED TO EXTERNAL HYDROSTATIC PRESSURE, by Myron E. Lunchick. Jan 61, 36p. 23 refs. Rept. 1393; AD-251 088.

DESCRIPTORS: *Cylindrical bodies, Pressure, *Stiffened cylinders, Hydrostatic pressure, Buckling, Deformation, Stresses, Plasticity, Failure (Mechanics), Measurement, Steel, Mathematical analysis, Aluminum alloys, Titanium alloys, Mechanical properties, Tests.

A cylindrical shell stiffened by uniformly spaced transverse rings and subjected to external hydrostatic pressure is analyzed for plastic buckling in the axisymmetric mode. In this analysis strain-hardening of the material is accounted for and Poisson's ratio is treated as a variable which varies from its value in the elastic state to an upper limit of 1/2 for incompressible material. The differential equation for the plastic range is derived for axisymmetric buckling. Expressions for the plastic axisymmetric buckling pressures are obtained. A criterion of length of shell for long and short cylinders is presented, below which the shell can buckle in only one half wave. As a special case of the problem considered, a solution for the plastic buckling of a long cylinder under end compression is obtained. This solution degenerates to that previously obtained by Gerard for a Poisson's ratio of 1/2 but represents a more rigorous solution in terms of variable Poisson's ratios. Limited experimental evidence is presented in support of the theory. (Author)

HW-68253 $1.25

Hanford Atomic Products Operation, Richland, Wash.
DEVELOPMENT OF CORROSION-RESISTANT ALUMINUM ALLOYS FOR HIGH-TEMPERATURE WATER SERVICE, by H. C. Bowen. Rept. on Contract AT(45-1)-1350. Mar 61, 51p.

HW-69678 $1.00

Hanford Atomic Products Operation, Richland, Wash.
RECOVERY AND RECRYSTALLIZATION OF ZIRCONIUM AND ITS ALLOYS. PART I: SPECIMEN COMPOSITIONS, COLD WORKING, HEAT TREATMENT, AND SURVEY OF THE LITERATURE, by S. H. Bush, R. S. Kemper and D. L. Gray. Rept. on Contract AT(45-1)-1350. May 61, 43p.

HW-69679 $1.50

Hanford Atomic Products Operation, Richland, Wash.
RECOVERY AND RECRYSTALLIZATION OF ZIRCONIUM AND ITS ALLOYS. PART 2: ANNEALING OF COLD-WORKED ZIRCONIUM, by D. L. Gray. Rept. on Contract AT(45-1)-1350. Mar 61, 61p.

AD-263 183 repriced $2.50

Lockheed Aircraft Corp., Sunnyvale, Calif.
PROPERTIES OF BETA TITANIUM, TITANIUM-VANADIUM, AND TITANIUM-ALUMINUM ALLOYS. AN ANNOTATED BIBLIOGRAPHY, by Helen M. Abbott. Rept. on Contract NOrd-17017. June 61, 120p. 269 refs. Special Bibliography SB-61-31; 3-80-61-4.

DESCRIPTORS: *Bibliography, *Titanium, *Titanium alloys, Vanadium alloys, Chromium alloys, Aluminum alloys, Phase transitions, Phase studies, Transformations, Hydrogen embrittlement, Processing, Manufacturing methods, Machining, Extrusion, Welding, Forging, Powder metallurgy, Rolling mills, Physical properties, Mechanical properties, Impact shock, Tensile properties, Elasticity, Hardness, Heat treatment, Stresses, Temperature, Alloys

The development of beta titanium alloys became prominent during the year 1958, therefore the literature search was limited to the period from 1958-June 1961. This bibliography contains a collection of available references on the properties and characteristics of beta titanium alloys, including B-120VCA, Ti-13V-11Cr-3Al, Ti-6Al-4V and other principal titanium-vanadium, titanium-aluminum alloys. The contents include: (1) Phase transformations (2) Mechanical properties (elastic modulus, tensile and yield strength, elongation, hardness, impact and compressive strength) (3) Thermal treatment (annealing and stress relieving temperatures) (4) Fabrication (forging temperatures, fusion weldability, formability, available forms and uses) (Author)

PB 158 062 $2.60

Northwestern Technological Inst., Evanston, Ill.
SOLID SOLUTION STRENGTHENING OF Ag BY Al, by A. A. Hendrickson and M. E. Fine. Technical rept. no. 2 on Contract Nonr-1228(11). 15 Nov 60, 24p. 20 refs. AD-249 253.

DESCRIPTORS: *Silver alloys, *Aluminum alloys, Alloys, Solids, Solutions, Single crystals, Crystal structure, Mechanical properties, Growth, Stresses, Aging, *Shear stresses, Microstructure.

The critical resolved shear stress (CRSS) and the strain rate dependence of the flow stress were studied on Ag-base Al single crystals as functions of testing

temperature (4.2 to 470 K) and Al content (0 to 6 at-%). Observations were made of the substructure, and measurements were made of the effect of growth rate on the CRSS. Results of the experiments support the proposed mechanism of solid solution hardening for Ag base Al crystals. At high temperatures, the increased CRSS of Ag through Al additions is effected mainly through an increased number of dislocations. Solid solution strengthening results from increased long-range interactions of gliding dislocations with stress fields from a larger number dislocations and/or the shortening of free dislocation lengths which act as dislocation sources. At low temperatures, dislocation intersections make important contributions to the CRSS; the low temperature CRSS increases with Al content because Al additions result in wider dislocations which are more difficult to intersect. (Author)

NMI-1252 $0.75

Nuclear Metals, Inc., Concord, Mass.
STABILITY OF THE HIGH TEMPERATURE BETA PHASE IN BERYLLIUM AND BERYLLIUM ALLOYS, by J. J. Pickett, E. D. Levine, and W. B. Nowak. Final technical rept. 1 July 60-30 June 61, on Contract AT(30-1)-1565. Sep 61, 34p.

ORNL-3139 $0.50

Oak Ridge National Lab., Tenn.
SURFACE PREPARATION OF METALLOGRAPHIC SPECIMENS OF ZIRCONIUM-BASE ALLOYS CONTAINING COPPER, by J. E. Spruiell and D. M. Hewette II. Rept. on Contract W-7405-eng-26. 8p.

PB 159 106 $2.60

Rensselaer Polytechnic Inst., Troy, N. Y.
NIOBIUM BASE MATERIALS, by F. V. Lenel, T. Myhre, and L. J. Regitz. Progress rept. no. 5 on Contract NOas-57-739 d. [1953] 22p. AD-211 054.

DESCRIPTORS: *Niobium compounds, *Hydrides, *Refractory materials, *Niobium, Powder metallurgy, Sintering, Extrusion, Processing.

The plan of work includes the following steps: (1) hydriding of niobium powder; (2) ballmilling of the brittle niobium hydride in an inert atmosphere; (3) compacting the fine niobium hydride powder under an inert atmosphere; (4) de-hydriding the niobium hydride compact in a vacuum furnace; (5) sintering the compact by resistance heating under pressure; and (6) extruding the sintered compacts during direct resistance heating.

PB 159 089 $2.60

[United] Nuclear Corp., White Plains, N. Y.
DISSOLUTION AND SOLUBILITY OF METALS IN LITHIUM, by B. Minushkin and H. Steinmetz. Rept. on Contract Nonr-2857(00). 31 Mar 60, 22p. 19 refs. NDA 2118-1; AD-245 984.

DESCRIPTORS: *Lithium, *Iron; Isotopes, *Metals, *Solubility, Solids, Liquids, Diffusion, Laboratory equipment, Plating, Electroplating, Chemical analysis, Colorimetric analysis, Phase studies, Thermodynamics, Solutions, Corrosion, Test methods.

This paper is a report of the initial phase of an investigation of the kinetics of dissolution and the solubility of structural metals in lithium. The theoretical background and considerations leading to the choice of experimental methods are presented. Activity to date has been concerned primarily with selection of methods, development of experimental techniques, procurement of materials and design, construction, installation, and shakedown of equipment. (Author)

Structural Metallurgy and Corrosion

TID-13099 $1.60

Battelle Memorial Inst., Columbus, Ohio.
CORROSION INVESTIGATION OF HASTELLOY X AND TUNGSTEN DURING DISSOLUTION OF ZrO_2 WITH HF, by F. W. Fink, P. D. Miller and E. L. White. July 61, 16p.

TID-13206 $1.60

Battelle Memorial Inst., Columbus, Ohio.
CORROSION INVESTIGATION OF INOR-8 UNDER FLUORINATION CONDITIONS, BY F. W. Fink. June 61, 17p.

PB 154 728 $5.60

Frankford Arsenal, Philadelphia, Pa.
STANDARDIZATION OF SALT SPRAY TESTING CHAMBERS AND TECHNIQUES. A PRELIMINARY REPORT, by Allen Frank. Feb 60, 54p. 99 refs. Memo. rept. no. M60-22-1; AD-247 902.

DESCRIPTORS: Sea water, *Corrosion, Simulation, Climatic factors, Salts, Sodium compounds, Chlorides, Controlled atmosphere, Fog, *Corrosion research, Test, Test methods, Test facilities, Standardization, *Bibliography, Metals, Coatings.

The object of the investigation was to determine the correlation that exists among various types of standard salt spray cabinets and to determine what degree of standardization of salt fog test variables, techniques, and procedures is possible. Significant details of the historical summation of the 46-year salt spray test are presented. Much emphasis in scientific literature and laboratory practice has been placed on a "standard sample" and an attempt to correlate resulting test data with outdoor exposure. This project pertains to the test method and techniques of handling the test in order to secure a workable standard method which gives realistic accelerated performance data when correlated with outdoor exposure. Twenty salt spray cabinet variables are presented and the latest information available to eliminate or minimize these variables to produce a more simplified standardized test method. Future plans to use "standardized test panels" and more accurately obtain correlated outdoor vs indoor exposure results are outlined. (Author)

HW-69681 $0.50

Hanford Atomic Products Operation, Richland, Wash.
RECOVERY AND RECRYSTALLIZATION OF ZIRCONIUM AND ITS ALLOYS. PART 4. CORROSION BEHAVIOR, by S. H. Bush, R. S. Kemper, and D. L. Gray. Rept. on Contract AT(45-1)-1350. May 61, 26p.

PB 158 591 $1.60

Illinois Inst. of Tech., Chicago.
THE ANNEALING BEHAVIOR OF EXPLOSIVELY DEFORMED COPPER, by A. S. Iyer and Paul Gordon. Technical rept. no. 7 on Contract Nonr-1406(03). 16 Dec 60, 12p. 2 refs. AD-249 149.

DESCRIPTORS: *Copper, Deformation, Crystal structure, Lattices, Hardness, Energy, Metallic crystals, Crystallization, Metallurgy, Explosive forming

An investigation was made of the annealing behavior of explosively deformed copper as compared to that of conventionally deformed copper. Hardness, stored energy, and the sharpening of X-ray spots on Debye rings were used as the measures of annealing; some metallographic observations were also made.

PB 158 645 $3.60

Illinois U., Urbana.
CATALYTIC EFFECTS IN THE INTERGRANULAR CORROSION OF HIGH-PURITY ALUMINUM IN HYDROCHLORIC ACID, by O. P. Arora, G. R. Ramagopal, and M. Metzger. Technical rept. no. 4 on Contract Nonr-1834(25). 28 Dec 60, 35p. 23 refs. AD-251 354.

DESCRIPTORS: *Aluminum, Hydrochloric acid, *Corrosion, Catalysis, Catalysts, Copper, Ions, Grains (Metallurgy), *Corrosion research.

The major results of quantitative studies of grain boundary and general corrosion in aluminus ranging in copper content from 1 to 600 ppm were: (1) In 16% HCl where the ratio of the intrinsic boundary-corrosion to general-corrosion rate of an Al was estimated as 8, the actual ratio of these rates was made to range up to 50 and down to nearly unity by varying catalytic action through the addition of increasing amounts of Cu ion to the acid. (2) Boundary corrosion was more rapid with increasing copper content; at least as little as 21 ppm Cu yields a substantial effect and one greater than that of any other residual element. (3) The view obtained of corrosion in this system is that boundary and general corrosion are related phenomena and change in the same direction but to different extents with changes in Cu content or acid composition. (Author)

PB 157 536 $9.10

Illinois Inst. of Tech., Chicago.
THE RECRYSTALLIZATION OF ZONE-REFINED ALUMINUM AS INFLUENCED BY RECOVERY AND IMPURITIES, by R. A. Vandermeer and Paul Gordon. Technical rept. no. 2 on Contract DA 11-022-ORD-1984 and Technical rept. no. 6 on Contract Nonr-1406(03). Oct 60, 106p. 22 refs. AD-247 446.

DESCRIPTORS: *Aluminum alloys, *Crystallization, Copper, Deformation, Grains (Metallurgy), *Aluminum.

Metallographic and calorimetric studies of the recrystallization of zone-refined aluminum and alloys of this aluminum with small quantities of copper have been carried out. The recrystallization is growth-controlled, nucleation being over at virtually zero annealing time. The rate of recrystallization is markedly lowered by small additions of copper, an atomic fraction of copper of 6.8 x 10 to the -5 power being enough to reduce the rate by a factor of 10,000 or more.

PB 158 589 $3.60

Massachusetts Inst. of Tech., Cambridge.
ATOMIC ARRANGEMENTS IN TITANIUM-MOLYBDENUM SOLID SOLUTIONS, by J. M. Dupouy and B. L. Averbach. Technical rept. no. 4 on Physical Metallurgy of Titanium Alloys, Contract Nonr-1841(02). 27 Dec 60, 32p. 23 refs. DSR 7433; AD-253 154.

DESCRIPTORS: *Titanium, *Molybdenum, Phase studies, X-ray diffraction analysis, Lattices, Atomic structure, Solids, Solutions, *Titanium alloys, *Molybdenum alloys.

The short range order and size effect coefficients as well as the thermal and static atomic displacements have been measured in bcc solid solutions of Ti-Mo using X-ray diffraction techniques. These solutions exhibit a strong preference for unlike near-neighbors even though a superlattice was not found. The size effect coefficients for the first shell of atoms were negative, indicating that the Mo atoms were smaller than the Ti atoms in solution. Center-to-center distances between the different pairs of nearest neighbor atoms were calculated from the size effect coefficients and the lattice parameters. Ti-Ti and Mo-Mo distances tended to approach the average distance in the solution at compositions between 20 and 50 at-% Mo. At 75% Mo the Mo-Mo distance was smaller than in pure Mo and this was taken to indicate an electron exchange in the solution. (Author)

ORNL-2833 $2.00

Oak Ridge National Lab., Tenn.
CORROSION ASSOCIATED WITH HYDROFLUORINATION IN THE OAK RIDGE NATIONAL LABORATORY FLUORIDE VOLATILITY PROCESS, by A. E. Goldman and A. P. Litman. Rept. on Contract W-7405-eng-26. 82p.

NUCLEAR PHYSICS AND NUCLEAR CHEMISTRY

WASH-1033 $1.25

Brookhaven National Lab., Upton, N. Y.
REPORTS TO THE AEC NUCLEAR CROSS SECTIONS ADVISORY GROUP, MIT AND YALE, 29-31 Aug 61. Oct 61, 49p.

PB 157 521 $6.60

Illinois U., Urbana.
TIME DEPENDENCE OF MOSSBAUER TRANSMISSION, by S. M. Harris. Technical rept. no. 20 on Research in Nuclear Physics, Contract Nonr-1834(05). Oct 60, 65p. 18 refs; AD-245 292.

DESCRIPTORS: *Nuclear physics, Nuclear reactions, *Recoil atom, Nuclear states, Time, Energy, Nuclei, *Nuclear resonance, Florescence

The Mossbauer effect (Recoilless Resonance Fluorescence) seems to have an almost unlimited number of applications in many diverse regions of physics. In solid state physics, it has already been used to probe the nature of the internal magnetic fields in solids. One can also gain a great deal of information about the phonon spectrum of crystals. In nuclear physics; the magnetic moment and quadrupolar interaction can be measured for extremely short lived excited states. The high Q of the resonant radiation has allowed a laboratory measurement of the transverse Doppler effect and the equivalence principle. Other investigators have utilized this effect in the study of Mach's principle, and parity conservation in strong interactions. More complete discussions of the applications of the Mossbauer effect can be found in the literature. The investigation described in this analysis was motivated by the experiments performed on the time dependence of filtered resonance radiation. (Author)

PB 155 182 $1.60

National Bureau of Standards, Washington, D. C.
PHOTODETACHMENT CROSS SECTION FOR ATOMIC CARBON NEGATIVE IONS, by Michael L. Seman, Morton A. Fineman, and Lewis M. Branscomb. Technical rept. on Contract Naonr-15-60. 1 Feb 61, 15p. 2 refs. Rept. 7080.

DESCRIPTORS: Photoelectrons, *Ions, Electron multipliers, Atoms, Carbon, Disks, Anodes, Tungsten wire, *Ion sources, *Ionic currents, *Gas ionization, Glow discharges, Mass spectroscopy, Carbon arc lamps, Carbon compounds, Monoxides, Proton cross sections.

A new hot cathode arc negative ion source and a bakeable crossed-beam photodetachment apparatus incorporating an electron multiplier permit the investigation of photodetachment cross sections of many ions not previously studied. The ion source contains a tungsten filament, a weak axial magnetic field, and a series of insulated, floating disks with center holes which are progressively smaller as one approaches the 1-mm-diameter anode aperture. Run at 400 ma in 50 microns of CO, the discharge yields up to 3×10^{-9} amps of C^- out of a total of over 1 microamp of negative ion current. The photodetachment apparatus was modified to permit bakeout and electron multiplier detection of postaccelerated electrons. The unfiltered light from a carbon arc lamp now yields photodetachment signals from negative ion currents (of H^-) as small as 2×10^{-11} amperes. Preliminary studies of the C^- spectrum give a cross section of $1.3 \pm 0.3 \times 10^{-17}$ cm^2 near 4620 A. (Author)

ORNL-3193 $4.50

Oak Ridge National Lab., Tenn.
NEUTRON PHYSICS DIVISION. Annual progress rept. for period ending 1 Sep 61, on Contract W-7405-eng-26. 363p.

ORNL-3216 $2.00

Oak Ridge National Lab., Tenn.
NEW SOLUTIONS OF THE BOLTZMANN EQUATION FOR MONOENERGETIC NEUTRON TRANSPORT IN SPHERICAL GEOMETRY, by Walter Kofink. Rept. on Contract W-7405-eng-26. 88p.

TID-13904 $4.60

Ohio State U., Research Foundation, Columbus.
THEORETICAL STUDIES IN NUCLEAR AND HIGH ENERGY PHYSICS, by Bernard Margolis. Final rept. 1 June 60-30 Sep 61, on Contract AT(11-1)-911. Oct 61, 47p. OSURF-1111 - Final.

NYO-9752 $1.10

Rochester U., N. Y.
THE SCATTERING CONSTANT FOR DOUBLY CHARGED PARTICLES IN NUCLEAR EMULSION, by M. V. K. Appa Rao and T. Yamanouchi. Rept. on Contract AT(30-1)-875. Aug 61, 11p.

PB 155 448 $1.60

Space Sciences Lab., General Electric Co., Philadelphia, Pa.
THE STARK EFFECT IN LITHIUM, by R. G. Breene, Jr. Rept. on Contract AF 04(647)269. Mar 61, 20p. 6 refs. Technical Information Series R60SD477; AD-253 392.

DESCRIPTORS: Atoms, Theory, *Atomic energy levels, *Atomic orbitals, Atomic spectrum, Excitation, *Lithium, Atomic structure, Nuclear spins, Energy, Mathematical analysis, Electrons, Electric fields.

The familiar hydrogenic form for the lithium outer orbitals is first demonstrated as justification for their application to matrix element calculation. The spin-orbit interaction for the 4d and 4f levels is subsequently computed. Under the approximation of zeroth-order degeneracy the linear Stark Effect for the 4d level is calculated for field strengths of 20,000 volts/cm and greater. Under the approximation of no zeroth-order degeneracy the quadratic Stark Effect is computed for field strengths of 20,000 volts/cm and less. (Author)

PB 158 572 $5.60

Washington U., Seattle.
SCATTERING OF 2 Bev/c MUONS IN CARBON AND LEAD, by G. E. Masek, L. D. Heggie and others. Rept. on Contract Nonr-477(12). [1960] 51p. 23 refs. AD-248 315.

DESCRIPTORS: *Meson scattering, *Carbon, *Meson cross sections, *Lead, Measurement, Scattering, Mesons.

The scattering cross section of high energy mu mesons in carbon and lead was measured, using a pure, monoenergetic beam of muons. Preparation, purification, and measured properties of the beam are described. The median momentum was 2.00 Bev/c, the spread in momentum was not more than 3.5%, and the effective contamination due to pions was 4.9 x 10 to the power -6. During the experiment the total number of muons incident on the apparatus was 2.5 x 10 to the power 7. Counter hodoscopes recorded the muons scattered from 14.4 g/sq cm of lead and from 27 g/sq cm of carbon. Inelastic as well as elastic processes were accepted. Scattered particles were observed at angles up to 12 deg. The lead data cover the same range as those cosmic ray experiments which appeared to indicate an anomalously large scattering. No anomaly is found; the lead scattering agrees closely with the distribution calculated by Cooper and Rainwater for purely electromagnetic interactions. The carbon data permit a better comparison with theoretical expectations, since one is measuring the single-scattering cross section directly, and one can account for the effects of nuclear structure rather accurately, using electron-scattering data and a detailed theoretical analysis. The carbon scattering results, based on 300 events in the region 70 Mev/c - 400 Mev/c momentum transfer, agree closely with theory. The upper limits which this result places on a non-electromagnetic scattering cross section and on a muon form factor are discussed. (Author)

Instruments and Installations

ANL-6439 $0.50

Argonne National Lab., Ill.
THE CONTINUOUS MONITORING OF BORIC ACID CONCENTRATION BY NEUTRON ABSORPTIOMETRY, by Roland J. Armani. Rept. on Contract W-31-109-eng-38. Oct 61, 20p.

ANL-6427 $1.25

Argonne National Lab., Ill.
PARTICLE ACCELERATOR DIVISION. Summary rept. Apr-Sep 60, on Contract W-31-109-eng-38. 53p.

ANL-6446 $1.50

Argonne National Lab., Ill.
SODIUM IODIDE AND SODIUM IODIDE CRYSTALS: THEIR USE IN SCINTILLATION COUNTING AND SPECTROMETRY, by Robert R. Kepple. A bibliography. Rept. on Contract W-31-109-eng-38. Oct 61, 64p. 297 refs.

UCRL-6298 $1.25

Lawrence Radiation Lab., U. of California, Livermore.
FAST TRANSIENT HIGH-INTENSITY GAMMA-RAY SOLID STATE DETECTORS, by William F. Lindsay. Rept. on Contract W-7405-eng-48. May 61, 52p.

UCRL-6505 $1.00

Lawrence Radiation Lab., U. of California, Livermore.
SOLID STATE NEUTRON DETECTORS, by James F. Murphy. Rept. on Contract W-7405-eng-48. May 61, 44p.

TID-13418 $4.60

Michigan U. Coll. of Literature, Science, and the Arts, Ann Arbor.
THE UNIVERSITY OF MICHIGAN 42-INCH CYCLOTRON, by W. C. Parkinson and R. S. Tickle. Progress rept. on Contract AT(11-1)-275. July 61, 48p. UMRI-2842-11-P.

ORNL-3189 $3.50

Oak Ridge National Lab., Tenn.
HEALTH PHYSICS DIVISION. Annual progress rept. for period ending 31 July 61, on Contract W-7405-eng-26. 258p.

ORNL-3058 $0.50

Oak Ridge National Lab., Tenn.
PERSONAL RADIATION MONITOR, by R. H. Dilworth and C. J. Borkowski. Rept. on Contract W-7405-eng-26. 22p.

NYO-2507 $3.60

Radiation Applications, Inc., Long Island City, N. Y.
THE TECHNOLOGY AND APPLICATIONS OF LARGE FISSION PRODUCT BETA SOURCES, by Jacques J. Weinstock, Ella Y. Mirocznik, and Kenneth D. Ziegel. Quarterly rept. 1 July-30 Sep 61, on Contract AT(30-1)-2186. Oct 61, 34p.

Nuclear Engineering and Power

APAE-69(Vol. 3) $9.75

Alco Products, Inc., Schenectady, N. Y.
SM-2 CORE AND VESSEL DESIGN ANALYSIS. Rept. on Contract AT(30-3)-325. Mar 61, 955p.

ANL-6403 $0.75

Argonne National Lab., Ill.
FAST REACTOR SHAPE FACTORS AND SHAPE-DEPENDENT VARIABLES, by W. B. Loewenstein and G. W. Main. Rept. on Contract W-31-109-eng-38. Nov 61, 29p.

TID-3306 $2.75

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
CRITICALITY, comp. by Raymond L. Scott. A bibliography of unclassified literature. Mar 61, 177p. 1145 refs.

NAA-SR-6291 $0.75

Atomics International, Canoga Park, Calif.
OUTGASSING EXPERIMENTS WITH MOLD GRADE GRAPHITE FOR THE HNPF, by J. J. Gill. Rept. on Contract AT(11-1)-GEN-8. Dec 61, 38p.

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Battelle Memorial Inst., Columbus, Ohio.
IN-PILE FISSION-GAS-RELEASE BEHAVIOR OF ALUMINA-COATED UO_2 PARTICLES IRRADIATED TO HIGH BURNUP, by Gilbert E. Raines and William H. Goldthwaite. Rept. on Contract W-7405-eng-92. Nov 61, 13p.

BMI-1554 $1.50

Battelle Memorial Inst., Columbus, Ohio.
PROGRESS IN THE DEVELOPMENT OF URANIUM CARBIDE-TYPE FUELS, ed. by Frank A. Rough and Walston Chubb. Final rept. on Contract W-7405-eng-92. Nov 61, 57p.

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Battelle Memorial Inst., Columbus, Ohio.
PROGRESS ON THE USE OF GAS-PRESSURE BONDING FOR FABRICATING LOW-COST CERAMIC, CERMET, AND DISPERSION FUELS, by Stan J. Paprocki. Rept. on Contract W-7405-eng-92. Nov 61, 42p.

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PROGRESS RELATING TO CIVILIAN APPLICATIONS DURING SEPTEMBER, 1961, by Russell W. Dayton and Cylde R. Tipton, Jr. Rept. on Contract W-7405-eng-92. Oct 61, 76p.

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Battelle Memorial Inst., Columbus, Ohio.
USE OF INTRINSIC RADIOTRACERS FOR INDUSTRIAL PROGRESS CONTROL, by James L. McFarling, Peter Gluck and others. Rept. on Contract W-7405-eng-92. Nov 61, 56p.

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Brookhaven National Lab., Upton, N. Y.
FISSION FRAGMENT ENERGY DEPOSITION FOR FORMATION OF CHEMICAL PRODUCTS IN TWO PHASE SYSTEMS, by John Sears and Meyer Steinberg. Sep 61, 45p.

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NUCLEAR SUPERHEAT DEVELOPMENT PROGRAM. Quarterly progress rept. no. 8, Apr-June 61, on Contract AT(11-1)-795. Nov 61, 176p.

CEND-117 $6.60

Combustion Engineering, Inc., Windsor, Conn.
NUSU STEAM PURITY TESTS, by V. C. Hall, Jr., J. S. Hucks, and R. C. Brayer. Rept. on Contract AT(11-1)-795. Jan 61, 59p.

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Dow Chemical Co., Denver, Colo.
CRITICALITY MEASUREMENTS PERFORMED IN SITU, by C. L. Schuske. Rept. on Contract AT(29-1)-1106. Nov 61, 17p.

GEAP-3632 $2.00

General Electric Co., San Jose, Calif.
HIGH POWER DENSITY DEVELOPMENT PROJECT, by L. K. Holland. Quarterly progress rept. Oct-Dec 60, on Contract AT(04-3)-361. Jan 61, 80p.

HW-70315 $0.50

Hanford Atomic Products Operation, Richland, Wash.
EROSION RESISTANCE OF SWAGED UO_2 FOLLOWING AN IN-REACTOR FUEL ROD CLADDING FAILURE, by M. K. Milhollen, G. R. Horn, and J. L. Bates. Rept. on Contract AT(45-1)-1350. June 61, 11p

HW-64561 $1.75

Hanford Atomic Products Operation, Richland, Wash.
HEAT TRANSFER CALCULATIONS FOR THE PRTR PRESSURIZED GAS-COOLED LOOP FACILITY, by J. Muraoka. Rept. on Contract AT(45-1)-1350. June 61, 70p.

HW-66119 $3.60

Hanford Atomic Products Operation, Richland, Wash.
PROGRESS IN PLUTONIUM RECYCLE RESEARCH AND DEVELOPMENT, by Herbert M. Parker and Laurence H. McEwen. July 60, 36p.

KAPL-2172 $0.75

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THERMAL AND RESONANCE FISSION-PRODUCT POISONING FOR U^{235} SYSTEMS, by C. R. Greenhow and E. C. Hansen. Rept. on Contract W-31-109-eng-52 Oct 61, 29p.

LAMS-2532(Vol. 1) $4.00

Los Alamos Scientific Lab., N. Mex.
MANHATTAN DISTRICT HISTORY. PROJECT Y: THE LOS ALAMOS PROJECT. VOLUME I. INCEPTION UNTIL AUGUST 1945, by David Hawkins. Rept. on Contract W-7405-eng-36. Dec 61, 388p.

MCW-1469 $1.00

Mallinckrodt Chemical Works, Weldon Spring, Mo.
PROCESS DEVELOPMENT. Quarterly progress rept. on Contract W-14-108-eng-8. Nov 61, 43p.

AD-262 305 $0.50

Materials Research Lab., Watertown Arsenal, Mass.
A COOLING FACILITY FOR REACTOR IRRADIATIONS, by F. A. Dugan, J. J. Floyd and others. Mar 61, 17p. 3 refs. MRL rept. no. 101.

DESCRIPTORS: *Research reactors, *Reactor coolants, Cooling, *Hilsch tubes, Refrigeration systems, Graphite-moderated reactors, Gamma rays, Neutrons, Absorption, Heating, Liquid cooled, Water.

The absorption of gamma-rays and neutrons by a sample subjected to irradiation in a nuclear reactor causes undesirable heating of the sample. This note describes a cooling device called a vortex tube which is used as a supplementary means of limiting sample temperatures in a water-cooled irradiation facility. The temperatures of samples were reduced by 30 to 50°C when the vortex tube was put into operation. (Author)

ORNL-3195 $0.50

Oak Ridge National Lab., Tenn.
THE RELEASE OF Kr^{85} FROM UO_2 IN ORR CAPSULES, by J. L. Scott. Rept. on Contract W-7405-eng-26. 15 p.

ORNL-3118 $0.50

Oak Ridge National Lab., Tenn.
A STUDY OF DISSOLUTION OF REACTOR FUELS CONTAINING ZIRCONIUM IN A TITANIUM VESSEL, by W. E. Clark and T. A. Gens. Rept. on Contract W-7405-eng-26. 23p.

IDO-16607 $2.00

Phillips Petroleum Co., Idaho Falls.
ENGINEERING TEST REACTOR CRITICAL FACILITY CONTROL SYSTEM MANUAL, by F. A. Meichle. Rept. on Contract AT(10-1)-205. June 61, 103p.

IDO-16722 $0.50

Phillips Petroleum Co., Idaho Falls.
THE MERITS OF INHERENT SHUTDOWN VS MECHANICAL SHUTDOWN OF A PLATE-TYPE, WATER-MODERATED AND REFLECTED REACTOR IN A RUNAWAY CONDITION, by F. L. Bentzen. Rept. on Contract AT(10-1)-205. Nov 61, 13p.

IDO-16721 $2.50

Phillips Petroleum Co., Idaho Falls.
SPERT III REACTOR FACILITY, by R. E. Heffner and T. R. Wilson. Rept. on Contract AT(10-1)-205. Oct 61, 122p.

SL-1915-1 $2.60

Sargent and Lundy, Chicago, Ill.
ENGINEERING EVALUATION STUDIES: HEAVY WATER MODERATED POWER REACTOR PLANTS. Quarterly progress rept. July-Sep 61, on Contract AT(38-1)-213. Oct 61, 26p.

SRO-59 $1.60

Savannah River Operations Office, Ga.
HEAVY WATER POWER REACTOR PROGRAM. Monthly progress rept. Sep 61, 15p.

DP-640 $0.75

Savannah River Lab., Aiken, S. C.
PDP MEASUREMENTS ON NATURAL URANIUM FUEL TUBES IN D_2O, by Norman P. Baumann. Rept. on Contract AT(07-2)-1. Sep 61, 30p.

NDA-2132-6 $1.50

United Nuclear Corp., White Plains, N. Y.
A STUDY OF WET STEAM AS A REACTOR COOLANT. Joint summary rept. 1 Oct 59-31 May 61, on Contract AT(30-1)-2303. Sep 61, 55p.

Radioactivity

PB 159 156 $3.60

Air Force Special Weapons Center, Kirtland AFB, N. Mex.
LIMITS FOR RADIATION CONTROL AND RELEASE OF AIR FORCE MATERIAL CONTAMINATED WITH FISSION PRODUCTS, by James L. Dick and William R. Hurdlow. Apr 58, 35p. 20 refs. AFSWC-TN-57-30, supersedes AFSWC-TN-56-2; AD-157 163.

DESCRIPTORS: *Air force equipment, *Radiological contamination, Maintenance personnel, *Radiation tolerance, Measurement, *Fission products, Dosage, *Radiation hazards, Physiology, Beta particles, Gamma rays, Military equipment, Air force supplies, Aircraft, Materials, Monitors.

Personnel working with aircraft and aircraft parts contaminated by mixed fission product debris are exposed to external and internal radiation hazards. Experiments have shown that the external hazard is, in every conceivable case, the limiting hazard for establishing safety precautions. Therefore, a beta-gamma survey of contaminated materials will be sufficient to determine if the material is to be released to an uncontrolled area. The dose rates from a decaying fission product mixture must be evaluated in terms of the age of the mixed fission products if one is to establish the true magnitude of the hazard. The range of external beta-gamma radiation measurements which will result in an integrated dose to human skin of no more than 1 rem/year for a continous 168 hr/wk exposure is 3.6 mrad/hr for materials contaminated with fission products 1 week old or less, to 0.25 mrad/hr for material contaminated with fission product greater than 3 years old. (Author)

ARF-1122-27 $2.50

Armour Research Foundation, Chicago, Ill.
ISOTOPIC SOURCES OF SECONDARY RADIATION, by I. Filosofo. Final rept. on Contract AT(11-1)-657. Feb 61, 131p.

TID-3086 $2.75

Atomic Energy Commission. Div. of Technical Information Extension, Oak Ridge, Tenn.
RADIOACTIVE-FALLOUT, comp. by William E. Bost, Hugh E. Voress, and Naomi K. Smelcer. A bibliography of the world's literature. Mar 61, 194p. 3500 refs.

SC-4610(RR) $0.50

Sandia Corp., Albuquerque, N. Mex.
ENVIRONMENTAL BETA-GAMMA RADIOACTIVITY IN AIR AT SANDIA LABORATORY, by R. E. Womelsduff. Third quarter 1961. Oct 61, 9p.

Waste Disposal

DLCS-1690204 $2.60

Duquesne Light Co., Shippingport, Pa.
RADIOACTIVE WASTE DISPOSAL SYSTEM PERIODIC RADIATION MONITORING SURVEY, CORE I, SEED 2. Oct 61, 24p.

HW-69627 $0.50

Hanford Atomic Products Operation, Richland, Wash.
DENSITY EFFECT ON TWO-FLUID FLOW: A FACTOR IN GROUND DISPOSAL OF AQUEOUS WASTE, by A. E. Reisenauer and P. P. Rowe. Rept. on Contract AT(45-1)-1350. May 61, 14p.

ORNL-3163 $0.50

Oak Ridge National Lab., Tenn.
THE EFFECTS OF INTERNAL HEAT GENERATION ON POT CALCINATION RATES FOR RADIOACTIVE WASTES, by J. J. Perona. Rept. on Contract W-7405-eng-26. 20p.

ORNL-3192 $1.00

Oak Ridge National Lab., Tenn.
EVALUATION OF ULTIMATE DISPOSAL METHODS FOR LIQUID AND SOLID RADIOACTIVE WASTES. PART II. CONVERSION TO SOLID BY POT CALCINATION, by J. J. Perona, R. L. Bradshaw and others. Rept. on Contract W-7405-eng-26. 44p.

TID-13226 $2.50

PneumoDynamics Corp., El Segundo, Calif.
SEA DISPOSAL CONTAINER TEST AND EVALUATION. Technical rept. on Contract AT(04-3)-367. June 61, 137p.

PHYSICS

PB 181 088 $3.00

Lockheed Aircraft Corp., Sunnyvale, Calif.
SUPERCONDUCTIVITY 1959 - 1961; AN ANNOTATED BIBLIOGRAPHY, by A. A. Beltran. Feb 61, 194p. 355 refs. Special Bibliography SB-61-11; AD-254 503.

DESCRIPTORS: *Superconductivity, Theory, Transition elements, Transition temperature, Thin films, *Superconductors, *Bibliography, Electrical properties

Current theory, properties, and applications of superconductors as presented in the literature from 1959 to February 1961, are covered in this annotated bibliography. The 355 entries, representing English and foreign language publications, are grouped into six major topics with subdivisions into specific subjects. Author and subject indexes facilitate location of specific items. (Author)

WIS-AEC-31 $1.60

Theoretical Chemistry Lab., U. of Wisconsin, Madison.
HYPERVIRIAL THEOREMS APPLIED TO MOLECULAR QUANTUM MECHANICS, by Joseph O. Hirschfelder and C. A. Coulson. Oct 61, 20p.

Acoustics

PB 157 397 $11.50

Acoustics Research Lab., Harvard U., Cambridge, Mass.
THE ACOUSTICS OF THUNDER, by Wilfred J. Remillard. Technical memo. no. 44 on Contract Nonr-1866(24). Sep 60, 158p. 124 refs. AD-253 115.

DESCRIPTORS: *Thunderclouds, *Lightning, *Acoustics, Mathematical analysis, Frequency, Sound transmission.

A survey was made of the extensive literature on lightning and the meteorological conditions which exist during thunderstorms. Particular emphasis was placed on phenomena which might affect the generation, development, and propagation of thunder. It was then possible to formulate mathematical models of a lightning stroke and of the lower atmosphere, which are consistent with these phenomena and which account for many of the salient features of thunder. Theoretical analysis predicts the existence of an invariant characteristic of the frequency spectra of thunder. A method was developed for obtaining such spectra when the time variation of the sound pressure is known. Then, a typical frequency spectra was deduced from the theoretical sound radiated by the model source, and the invariant characteristic (the product of the observation distance and the dominant frequency) was calculated. (Author)

NYO-2576 $4.60

Aeroprojects Inc., West Chester, Pa.
APPLICATIONS OF ULTRASONIC ENERGY. TASK 1: ULTRASONIC CHEMICAL PROCESSING. TASK 2: ULTRASONIC METAL AND CERAMIC POWDER PROCESSING. TASK 3: ULTRASONIC INSTRUMENTATION. Progress rept. 1 June-31 July 60, on Contract AT(30-1)-1836. 46p.

PB 157 385 $2.60

Bolt Beranek and Newman, Inc., Cambridge, Mass.
RESPONSE OF STRINGS TO MOVING NOISE FIELDS, by Gideon Maidanik and Richard H. Lyon. Rept. on Contract Nonr-2321(00). 25 Oct 60, 21p. 5 refs. Rept. no. 776; AD-249 051.

DESCRIPTORS: *Noise, Sound, Acoustics, *Turbulent boundary layer, Vibration, Vibration mechanisms, Statistical functions, Gas flow

A re-examination of Lyon's (J. Acoust. Soc. Am. 28:391-398, 1956) experimental results on turbulent excitation of strings is made in the light of new information on boundary layer turbulence and on extended theoretical calculation. The extended theory together with reasonable modifications in the parameters describing the turbulent flow leads to better agreement between experiment and theory. (Author)

PB 157 384 $3.60

Bolt Beranek and Newman, Inc., Cambridge, Mass.
THE USE OF DELTA FUNCTION FOR THE CORRELATIONS OF PRESSURE FIELDS, by Gideon Maidanik. Rept. on Contract Nonr-2321(00). 25 Oct 60, 34p. 6 refs. Rept. no. 772; AD-249 050.

DESCRIPTORS: *Elasticity, Pressure, *Statistical functions, *Fluid mechanics

Using essentially the methods of Lyon and Dyer (J. Acoust. Soc. AM. 28:391-398, 1956; 31:922, 1959; and AD-208 459) the response of a one dimensional simply supported elastic system (such as a string or a bar) to random convecting force fields is calculated. The spatial as well as the time dependence of the correlation function of the force field are assumed to decay exponentially. The response is analyzed as a function of the force field parameters in relation to the dynamic characteristics of the system. Special attention is focussed on the limiting case where the correlation function approaches the delta function form in space or time or both. In this way a criterion is established for the validity of the delta function approximation for such problems. (Author)

PB 158 638 $10.10

Chesapeake Bay Inst., Johns Hopkins U. [Annapolis, Md.]
A STATISTICAL STUDY OF SOUND FLUCTUATIONS IN AN ESTUARY, by J. R. Smithson. Rept. on Contract Nonr-248(20). Dec 60, 121p. 20 refs. Special rept. no. 6; Reference 60-4; AD-251 879.

DESCRIPTORS: *Estuaries, *Underwater sound transmission, Low frequency, Transducers, Acoustic detectors, Hydrophones, Temperature, Statistical analysis.

Recordings were made of short pulses of 100-kc sound transmitted at a rate of 12 pps over a path of 100 ft between fixed transducers in the Severn River at Annapolis, Maryland. Signals received by direct transmission and by surface reflection were recorded separately. These signals were transmitted from a single transducer and received simultaneously on three hydrophones with different horizontal and vertical separations. Recordings were also made of the temperature differences among three pairs of thermistors with various separations and at various depths. Fluctuations in the amplitude of sound signals received by direct transmission were only found in the presence of a sound velocity gradient and a current which produced a changing gradient, whereas large fluctuations were always present in surface-reflected signals. Temperature fluctuations were found when there was a changing temperature gradient. The coefficient of variation for directly transmitted signals ranged from near zero to 0.214; for surface-reflected signals from 0.403 to 0.513. Surface-reflected signals had an autocorrelation which approached zero in 1/6 second and fluctuation frequencies up to 6 cps. Directly transmitted signals had an autocorrelation which approached zero in 17 or more seconds and no fluctuations at frequencies above 0.2 cps. (Author)

PB 158 576 $2.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
THE REFLECTION AND TRANSMISSION OF SOUND BY ELASTIC SHELLS, by R. R. Goodman, W. C. Meecham and others. Rept. on Contract Nonr-1224(24). Dec 60, 26p. 5 refs. 2784-5-T; AD-247 741.

DESCRIPTORS: Elastic shells, *Sound transmission, Sound, Reflection, Bessel functions, Mathematical analysis, Polynomials.

The sound fields resulting from a plane wave incident on a spherical elastic shell are found. Then both the internal and external fields due to the shell are considered. Several limiting cases of the spherical shell are considered and compared with well-known results. The Rayleigh limit is discussed, and it is found that the external field is similar to that produced by a rigid sphere but with more complicated coefficients. The internal field is of a complicated nature but reasonable to consider for numerical computation. The sound fields for a hemispherical shell mounted on a rigid medium are obtained by the image method. (Author)

PB 158 577 $3.60

Institute of Science and Tech., U. of Michigan, Ann Arbor.
THE TRANSMISSION OF SOUND BY A HEMISPHERICAL SHELL MOUNTED ON A RIGID PLATE, by Raya Stern. Rept. on Contract Nonr-1224(24). Dec 60, 36p. 1 ref. 2784-6-T; AD-247 742.

DESCRIPTORS: *Sound transmission, Hemispherical shells, Fluids, Mathematical analysis, Elastic shells.

Solutions were previously given [AD-247 741] to the problem of finding the acoustic field caused by an incident plane acoustic wave impinging on a hemispherical shell mounted on a plate immersed in a fluid. Calculations are now presented for various shell materials when the fluid is assumed to be sea water. The exact solution was computed for various frequencies and compared with the simplified solution, which is

independent of frequency. For low values of the frequency, the assumptions used to simplify the solution are valid and the results agree very closely. A summary of the problem is presented, and a discussion of the computation is given. A summary and discussion of the results are given along with detailed graphic representation of the results. (Author)

PB 158 571 $3.60

Narragansett Marine Lab., U of Rhode Island, Kingston.
NORMAL MODE THEORY OF SOUND PROPAGATION IN LIQUID-LIQUID-SOLID LAYERED MEDIA, by L. Diesendruck. Technical rept. no. 5 on Contract Nonr-396(04). Dec 60, 37p. 4 refs. Reference no. 60-3; AD-250 306.

DESCRIPTORS: *Underwater explosions, Theory, *Sound transmission, Mathematical analysis, *Underwater sound transmission.

An investigation was made to interpret the results of underwater explosion measurements carried out in shallow water. The existing conditions are that both source and receiver are in a water layer above a layer of sediment which, in turn, is over rock. The situation is that of a liquid-liquid-solid layered medium and the usual assumptions for underwater sound propagation should result in an expression for the potential in the water layer in the form of an integral. A general expression for the potential integral in a layer was obtained where the effects of all other layers are represented by reflection coefficients at the boundaries. If there are more than 2 layers, these have to be considered as effective reflection coefficients. The effective reflection coefficients for 3 (or more) layered cases is obtained and the potential integral is explicitly obtained for the liquid-liquid-liquid and the liquid-liquid-solid cases.

Electronics

PB 158 107 $1.10

Digital Computer Lab., U. of Illinois, Urbana.
A METHOD FOR FACTORING THE ACTION OF ASYNCHRONOUS CIRCUITS, by W. D. Frazer and D. E. Muller. Rept. on Contract Nonr-1834(27). 2 Nov 60, 9p. 1 ref. Rept. no. 104; AD-250 008.

DESCRIPTORS: Algebras, *Factor analysis, Topology, Mathematical analysis, Digital computers, *Electronic circuits.

A procedure to analyze and trace the behavior of asynchronous circuits while testing certain properties of this behavior is discussed. Information concerning the topology or interconnection structure of the circuit is used to simplify the analysis. (Author)

PB 154 996 $8.10

Electronic Defense Labs., Mountain View, Calif.
FORWARD COHERENT AND INCOHERENT SCATTERING FROM RANDOM VOLUME DISTRIBUTION OF SPHERES, by C. L. Beard and V. Twersky. Rept. on Contract DA 36-039-sc-85402. 6 June 60, 83p 16 refs. EDL-E46; AD-246 677.

DESCRIPTORS: *Spheres, *Electromagnetic waves, Scattering, Turbulent flow, Styrenes, Expanded plastics, Plastics, Compressible flow, Gases, Microwaves, Theory.

This is one of a series of papers comparing theory and experiments on scattering by a large scale dynamical model of a "compressible gas". The "molecules" are 1.36" diameter styrofoam spheres moving within a 10" x 20" x 24" container. The distribution of spheres ("randomized" by a system of blowers and turbulence producing wedges, and by collision processes) is determined optically, and microwave scattering measurements are made at 5-mm. The results are summarized of a systematic program of measurements and computations of the forward scattered coherent, incoherent, and total intensities as functions of the fractional volume v (the total volume of scatterers divided by the volume of the "gas container"); we cover the range from v= 0.0069 (a more or less "rare gas") to v = 0.495 (a "very dense gas" or "near liquid; i.e., compared with v= 0.524 which corresponds to closest cubic packing of spheres). The computations are based on theoretical expressions derived by a self-consistant procedure which regards each scatterer of the distribution as excited by the coherent field, but radiating into free space; interms of such "schizoid" single-scatterers, dense distributions are treated essentially by the simple formalism that holds for sparse cases. Good accord between experiment and this theory exists over the full range of fractional volume investigated. (Author)

PB 155 000 $5.60

Electronic Defense Labs., Mountain View, Calif.
SCATTERING BY ELLIPSOIDS, by J. E. Burke and V. Twersky. Rept. on Contract DA 36-039-sc-78281. 1 Mar 60, 51p. 9 refs. EDL-M260; AD-239 719.

DESCRIPTORS: Ellipsoids, *Electromagnetic fields, Electromagnetic waves, High frequency, *Electromagnetic wave reflections, Scattering, *Diffraction, Mathematical analysis.

Using elementary methods, high frequency approximations are obtained for the fields scattered (reflected and diffracted) by an arbitrary body in three dimensions. These general results are then specialized to ellipsoids, and the far field scattering characteristics of certain families of such surfaces are considered in detail. In particular, in any plane containing the direction of incidence and the major axis of the ellipsoid, independently of the angle of incidence, there is a unique curve of intensity versus angle with respect to the ray specularly reflected from the axis of the ellipsoid. For the special case of the spheroid, when one moves out of the plane containing the direction of incidence and major axis, the field on the "axially specular" rays remains constant until one gets into the shadow region of the scatterer; the field on adjacent rays (i.e., at other than the specular angle with the axis) depends only slowly on the azimuthal angle. Neglecting the slowly varying angular effects, and discounting the shadow region, the field scattered by a given spheroid is then essentially a thick conical lobe of revolution whose maximum is the axially-specular cone. This result simplifies computations for such bodies. (Author) (See also PB 154 996)

Molecular Physics and Spectroscopy

PB 158 316 $1.60

Emory U., Ga.
PROGRAM IN MICROWAVE SPECTROSCOPY, by James W. Simmons and J. H. Goldstein. Final rept. 1 Sep 55-31 Aug 59, on Contract DA 01-009-ORD-440. 30 Nov 59, 16p. 6 refs. AROD rept. no. 551.20; AD-230 165.

DESCRIPTORS: *Microwave spectroscopy, *Molecular spectroscopy, Ultraviolet spectroscopy, Dipole moments, Molecular structure

The comprehensive program of microwave spectroscopy involved an extension of the frequency range of study and the inclusion of a recording system to obtain better resolution and greater precision in determination of molecular structure, dipole moments, and characteristics of the chemical bonding in organic molecules. The program involved: (1) more extensive use of X-band and KU-band frequencies for better resolution and molecular structural determinations; (2) molecular dipole moment determination for the ground vibrational state and for low-lying excited bending and torsional modes; (3) evaluation of quadrupole coupling parameters for molecules containing nuclei having electric quadrupole moments; (4) measurement of vibrational and torsional frequencies and approximate evaluation of potential barriers hindering internal distortion; (5) utilization of the microwave data correlated with UV and IR data in quantum mechanical calculations, involving valence, structure, and other properties; and (6) correlation of the microwave data with new data obtained from nuclear magnetic resonance studies. Organic molecules, which were studied in some detail, included acrolein, chloroallene, ethyl iodide, chlorobenzene, bromobenzene, propiolactone, and vinyl bromide.

PB 157 508 $12.00

Florida State U., Tallahassee.
SPECTROSCOPY AND PHOTOCHEMISTRY CONFERENCE PAPERS, by M. Kasha. Technical rept. no. 3 on Electronic Levels of Complex Molecules, Contract Nonr-1562(00). 1 Sep 60, 168p. 106 refs. AD-250 800.

DESCRIPTORS: *Ultraviolet spectroscopy, *Quantum mechanics, *Molecular spectroscopy, *Photochemistry, Organic compounds, Dyes, Electron transitions, Atomic orbitals, Radiation effects, Excitation, Molecules.

This report includes:
Paths of Molecular Excitation, by Michael Kasha. 1960 1v. incl. illus. Presented at the Conference on Bioenergetics, Brookhaven National Laboratory, Upton Long Island, October 1959.
The Nature and Significance of n Transitions, by Michael Kasha. 1960 1v. incl. illus. (Presented at the Symposium on Light and Life, The McCollum-Pratt Institute, The Johns Hopkins University, Baltimore, Maryland, March 28-31, 1960.)
Ultraviolet Radiation Effects: Molecular Photochemistry, by Michael Kasha. 1960, 1v. incl. illus. (Presented at the Symposium on the Comparative Effects of Various Radiations, San Juan, Puerto Rico, February 1960.)

PB 158 634 $1.60

Gates and Crellin Labs. of Chemistry, Calif. Inst. of Tech., Pasadena.
NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY. THE STRUCTURE OF BUTENYLMAGNESIUM BROMIDE, by J. Eric Norlander, William G. Young, and John D. Roberts. Technical rept. no. 12 on Contract Nonr-220(26). 1 Dec 60, 7p. 12 refs. Contribution no. 2649; AD-247 909.

DESCRIPTORS: *Nuclear magnetic resonance, *Spectrographic analysis, Nuclear spins, *Grignard reagents, Molecular structure, *Butenyl radicals, Magnesium compounds, Bromides.

The nuclear magnetic resonance spectrum of the butenyl Grignard reagent produced by reacting magnesium in ether with either crotyl bromide or alpha-methylallyl bromide indicates that it is largely the crotyl isomer.

PB 158 317 $7.60

Hawaii U. [Honolulu].
IONIZATION POTENTIAL OF MOLECULES BY A PHOTOIONIZATION METHOD, by K. Watanabe, T. Nakayama, and J. Mottl. Final rept. Mar 56-Dec 59, on Contracts DA 04-200-ORD-(480, 737). Dec 59, 73p. 112 refs. OOR rept. no. 1624.6; AD-231 889.

DESCRIPTORS: *Ionization potentials, Molecules, Measurement, *Molecular structure, *Photoelectric effect, Monochromatic light, Photons, *Electron transitions, Ionization chambers, Photomultipliers, Molecular spectroscopy, Tables.

The measurements of molecular ionization potential by a photoionization method are summarized utilizing a 1-M vacuum monochromator in the photon energy range from 7 to 15 ev. The apparatus and experimental technique are reviewed, the principal sources of error are pointed out, and the types of ionization yield curve are described in terms of possible electronic transitions. The adiabatic ionization potentials of about 300 molecules determined by photoionization method are assembled in 13 tables, which include estimates of experimental uncertainties. In about 40 cases where comparisons can be made, results agreed closely with the spectroscopic values. For several molecules, disagreements were found, but restudies of their absorption spectra yielded new Rydberg series limits which agreed with the photoionization values. Discussions on the identity of the most loosely bound electrons, the effect of alkyl substitution, the relationship between ionization continua and absorption bands, and possible molecular structures are given for some of the molecules. (Author)

AD-259 126 $21.00

Laboratory of Molecular Structure and Spectra, U. of Chicago, Ill.
TECHNICAL REPORT, 1959-1960. Rept. for 1 June 59-31 Jan 61 on Contracts Nonr-2121(01), DA 11-022-ORD-3119, AF 19(604)3478, AF 19(604)6662, and AF 49(638)699. [1961] 381p. 750 refs. AFOSR-1015.

DESCRIPTORS: *Molecular structure, *Molecules, *Molecular association, *Molecular spectroscopy, Ultraviolet radiation, Germanium, Chemical bonds, Monochromatic light, Nitrogen, Absorption, Refraction, Refractive properties, Ultraviolet spectroscopy, Iodine, Carbon compounds, Chlorine compounds, Rotating structures, Chlorides, Ions, Carbon tetrachloride, Atoms, Ammonium radicals, Energy, Deuterated compounds, Ethylenes, Atomic orbitals, Benzenes, Methyl radicals, Anilines, Butyl radicals, Phosphates, Oxygen, Organic compounds, Helium, Electrons, Lithium, Beryllium, Dipole moments, Hydrogen, Carbon dioxide, Quinones

This report includes 29 reprints and the following reports: Rotational structure of a new spectrum attributed to CCl^+; Hyperconjugation and the basicities of the methyl benzenes; Configuration interaction in simple atomic systems; Studies in molecular structure: IV, Potential curve for the interaction of 2 helium atoms in single-configuration LCAO-MO-SCF approximation; V, Computed stereoscopic constants for selected diatomic molecules of the first row; The properties of variously approximated SCF MO wave functions; Double-zeta SCF MO calculation of the ground and some excited states of N_2^+.

PB 158 575 $3.60

Massachusetts U., Amherst.
AN AUTOMATIC X-RAY DIFFRACTOMETER FOR STUDIES OF POLYMER ORIENTATION, by Donald G. LeGrand, Daniel Keedy, and Richard S. Stein. Technical rept. no. 26 on Contract Nonr-2151(00). 2 Dec 60, 37p. 9 refs. AD-247 753.

DISCRIPTORS: *X-ray diffraction analysis, *Polymers, Instrumentation, Automatic, Design, Programming, Ethylenes

The automatic x-ray diffractometer is to be used for determining the x-ray diffraction patterns of oriented polymer samples automatically and with a definite statistical error. The unit possesses more unique features than commercial diffractometers such as the automatic azimuthal and radial scans with recycling at the same or elevated temperatures. The diffractometer quadrant is calibrated in degrees and mounted in a horizontal position. A standard Norelco x-ray generator and a Norelco 62019 mica window Geiger tube are employed. The types of programs which can be set up are (1) repeated radial scans at one particular azimuthal angle, (2) repeated azimuthal scans at one particle radial angle, (3) repeated azimuthal or radial scans, or combinations thereof, over smaller angular intervals, (4) repeated combinations of the above over a long time interval, and (5) repeated combinations of the above followed by a temperature change. The programming operation is described in detail. Examples are given for polyethylene of (1) a radial-azimuthal-radial or wheel-and-axle program and (2) a wheel-and-spoke program with radials at different azimuthal angles.

PB 157 809 $8.60

Massachusetts Inst. of Tech., Cambridge.
SOLID-STATE AND MOLECULAR THEORY GROUP. Quarterly progress rept. no. 38 on Contract Nonr-1841(34). 15 Oct 60. 100p. 58 refs. AD-246 646

DESCRIPTORS: *Solids, Theory, *Molecular spectroscopy, Atomic spectrum, Energy, Hydrogen, Acetylenes, Water, Molecules, Iron, Metals, Electromagnetic waves, Atomic orbitals, Crystals, Electrons, Nickel, Solid state physics.

Contents:
A molecular orbital treatment of the ring of six hydrogen atoms
The effective exchange integral
An SCF-MO treatment of linear and bent acetylene
A configuration interaction study of the electronic states of the water molecule
Energy bands in nickel and iron
Extension of augmented plane wave programs
Interpretation of some potassium ferro cyanide absorption spectra
Diamagnetic shielding of nuclei in metals
The interaction of acoustic and electromagnetic waves in crystals
The two-configuration approximation for four-electron ions
Information processing machines involving Lamellar storage
(See also PB 149 591)

TID-13419 $1.10

Notre Dame U., Indiana.
STUDIES IN NUCLEAR SPECTROSCOPY, by Richard C. Pilger, Jr. Technical progress rept. 1 July 60-30 June 61, on Contract AT(11-1)-834. Aug 61, 9p.

PB 158 656 $1.60

Noyes Chemical Lab., U. of Illinois, Urbana.
ELECTRON COUPLING OF PROTON SPINS IN HETEROCYCLIC MOLECULES. N-BENZYL-THIENO[3, 2-b]PYRROLE, by H. S. Gutowsky and A. L. Porte. Technical rept. no. 38 on Contract Nonr-1834(13). 29 Dec 60, 20p. 34 refs. AD-250 681.

DESCRIPTORS: *Nuclear magnetic resonance, Protons, *Pyrroles, Benzyl radicals, Electrons, *Nuclear spins, Heterocyclic compounds, Spectrographic analysis

The high-resolution proton magnetic resonance spectrum of the four protons attached to the heterocyclic

rings of N-benzylthieno 3, 2-b pyrrole (I) has been examined. The spectrum is of the type ABCD perturbed by two nuclei X_2 which couple with A, and it involves three long-range proton-proton couplings, 0.5, 1.3 and 0.3 cps over five, six, and six bonds respectively, which can be accounted for only by pi electron interactions. The coupling constants found in each of the rings in I are compared with those for thiophene and pyrrole. Angular effects as well as electronegativity differences govern the coupling via sigma electrons in HCCH groups. (Author)

PB 158 021 $2.60

Noyes Chemical Lab., U. of Illinois, Urbana.
ELECTRON SPIN RESONANCE STUDIES OF A WEAKLY COUPLED BIRADICAL, by D. H. Anderson, H. S. Gutowsky, and R. B. Sandin. Technical rept. no. 37 on Contract Nonr-1834(13). 29 Nov 60, 27p. 25 refs. AD-250 680.

DESCRIPTORS: *Paramagnetic resonance, *Nuclear spins, Temperature, *Electrons, Hyperfine structure, *Ethylenes, Phenyl radicals, Methyl radicals, Amines.

Electron spin resonance, including its temperature dependence, has been studied in several solid salts derived from α,α,β,β-tetrakis-(4-dimethylaminophenyl)-ethylene(I). The paramagnetism appears to result from thermal excitation to low lying triplet electronic states in which the unpaired electrons are only weakly coupled. Excitation energies of 4.5 and 8.6 kcal/mole are found for the I-diiodide and the I-dinitrate, respectively. It is suggested that the averaging out of hyperfine and electron dipole-dipole splittings results from delocalization of the unpaired electrons and from exchange interactions which may be aided by the "diffusion" of the paramagnetic species which results from the thermal excitation and deactivation. (Author)

PB 157 410 $5.60

Noyes Chemical Lab., U. of Illinois, Urbana.
PROTON MAGNETIC RESONANCE STUDIES OF STRUCTURE, DIFFUSION AND RESONANCE SHIFTS IN TITANIUM HYDRIDE, by B. Stalinski, C. K. Coogan, and H. S. Gutowsky. Technical rept. no. 34 on Contract Nonr-1834(13). 6 Oct 60, 58p. 43 refs. AD-248 962.

DESCRIPTORS: Temperature, Magnetic fields, Diffusion, Hydrogen, Electrons, Protons, *Lattices, *Nuclear magnetic resonance, *Titanium compounds, *Hydrides.

Measurements of the proton magnetic resonance at about 26.9 Mc/sec in titanium hydride samples, ranging in composition $TiH_{1.61}$ to $TiH_{1.97}$, have been made in the temperature range from -196 to about 200C. The second moment of the proton resonance at the lower temperatures shows that the hydrogen atoms are randomly distributed among the lattice sites which are located tetrahedrally with respect to the titanium atoms. Self-diffusion of the hydrogen atoms narrows the proton resonance above room temperature. The temperature dependence of the correlation frequency for the proton motions, leads to diffusional activation energies which increase with hydrogen content from 9.4 kcal/g atom for $TiH_{1.607}$ to 10.2 for $TiH_{1.923}$. The diffusion rate is directly proportional to the number of unfilled tetrahedral holes in the metallic lattice, which indicates that the self-diffusion takes place via a vacancy mechanism. Proton resonance shifts to higher applied magnetic fields were observed. They were found to increase from 0.01% for $TiH_{1.607}$ to about 0.032% for $TiH_{1.969}$. The results suggest that the hydrogen is held in the lattice by a combination of covalent and ionic bonding, the latter involving a net positive charge on the hydrogen. (Author)

PB 158 593 $1.60

Stanford Research Inst., Menlo Park, Calif.
DIFFUSIONAL TRANSPORT OF ATOMIC HYDROGEN THROUGH MOLECULAR HYDROGEN AT ELEVATED TEMPERATURES, by Henry Wise. Rept. on Contract Nonr-1858(25). Dec 60, 15p. 21 refs. Proj. Squid Technical rept. SRI-9-P; AD-250 106.

DESCRIPTORS: *Hydrogen, *Atomic structure, *Molecular structure, Transport properties, Measurement, Diffusion, Temperature, Gases, *Thermal diffusion.

Changes in the transport properties of a gas mixture of atomic and molecular hydrogen were measured in a temperature range from 300 to 700 K. The steady-state distribution of atoms diffusing from a source towards a catalytically active surface was determined in a cylinder of finite length. The experimental parameter of interest is the diffusion Reynolds number which contains the ratio of interdiffusion coefficient to recombination coefficient. If the catalytic activity of the surface is known, one may relate the atom-concentration gradient to the diffusion coefficient. In the temperature region studied the change in the binary diffusion coefficient was evaluated. From the results, the intermolecular force fields applicable to the atom-molecule encounters were examined. (Author)

PB 158 653 $2.60

Washington State U. [Pullman].
RESEARCH IN THE VACUUM X-RAY REGION FROM 3 TO 20 ANGSTROMS, by S. T. Stephenson. Final rept. 1 Nov 46-31 Aug 60, on Contract N6ori-167, T.O. 2. [1960] 24p. 31 refs; AD-249 997.

DESCRIPTORS: *X-ray absorption analysis, *Single crystals, Germanium, Arsenic, Gases, Chlorine, Molecules, *Absorption, *X-ray spectrometers.

Contents:
Part I
Development of the vacuum spectrometer for both single and double crystal work
The continuous X-ray spectrum to 15A
The K-absorption spectra of germanium and arsenic in gaseous molecules
The K-absorption spectrum of chlorine in different gaseous and solid compounds

The K-absorption spectrum of chlorine in different solid single crystals using polarized X-rays
The K-absorption spectra of single crystals of copper and germanium
The single-crystal orientation effects in absorption spectra
Part II
Fine structure of the K X-ray absorption edge of germanium

Optics

PB 159 103 $3.60

Ballistic Research Labs., Aberdeen Proving Ground, Md.
SYSTEMATIC ERRORS OF CINE-THEODOLITES, by H. Schmid. Aug 51, 31p. 2 refs. Rept. no. 764; ATI-119 614.

DESCRIPTORS: *Phototheodolites, Theodolites, Operation, Errors, Corrections.

Instrumental errors of cine-theodolites are discussed and methods for correction are described. A method for determining the eccentricity of the dials is outlined in detail and numerical examples are added. The influence of residual instrumental errors on the measured azimuth and elevation angles is shown. The methods are applicable to optical instruments whose design is based on the principle of a theodolite. (Author)

AD-263 182 repriced $3.00

Lockheed Aircraft Corp., Sunnyvale, Calif.
EMISSIVITY. AN ANNOTATED BIBLIOGRAPHY, by A. A. Beltran. Rept. on Contract AF 04(647)787. July 61, 157p. 322 refs. Special Bibliography SB-61-38; 3-77-61-6.

DESCRIPTORS: *Materials, *Optics, *Bibliography, Solids, Infrared radiation, Light, Ultraviolet radiation, Thermal radiation, Optical analysis, Temperature.

The literature on the emissivity of materials in the infrared, visible and ultraviolet spectrum at temperatures to 3300°K is covered in this bibliography. Materials from 1905 through 1961 are included. (Author)

PB 159 134 $4.60

Massachusetts U., Amherst.
CORRECTION FACTORS FOR THE SCATTERING OF POLARIZED LIGHT BY POLYMER FILMS, by Richard S. Stein and Philip R. Wilson. Technical rept. no. 27 on Contract Nonr-2151(00). 15 Jan 61, 50p. 2 refs. AD-252 057.

DESCRIPTORS: *Thin films, Polymers, *Light, Refraction, Scattering, Polarization, Measurements, Intensity, Equations, Mathematic analysis, Plastic coatings, Films

PB 159 155 $3.60

Material Lab., New York Naval Shipyard, Brooklyn.
OPTICAL TRANSMITTANCE, REFLECTANCE, AND ABSORPTANCE OF MATERIALS, by R. F. Byrne and L. N. Mancinelli. Final rept. 12 Mar 54, 40p. 6 refs. Lab. Project 5046-3, part 36; AFSWP-396.

DESCRIPTORS: *Materials, Textiles, Woolen textiles, Cotton textiles, Metals, Paper, Plastics, Paint, Varnishes, *Optics, Reflection, *Thermal radiation, Absorption, *Infrared spectroscopy.

The optical characteristics of various materials have been determined in connection with a study of the effects of intense thermal radiation on materials. The data include measurements of the spectral transmittance and spectral reflectance in the region from 2200 to 27000 Angstroms, spectral absorptance computed from these data, and the total radiant absorptance computed for several radiation sources. (Author)

PB 159 102 $8.60

Naval Ordnance Lab., White Oak, Md.
FAST FIELD EFFECT AND PHOTORESPONSE STUDIES ON LEAD SULFIDE PHOTOCONDUCTORS, by Howard E. Sorrows. 15 May 58, 96p. 33 refs. NAVORD rept. 6164.

DESCRIPTORS: *Thin films, *Lead compounds, *Sulfides, *Infrared photoconductors, *Infrared detectors, Photoconductivity, Photosensitivity, Electric fields, Electrical effects, Alternating current.

Concurrent studies of field effect and photoconductivity in thin-film lead-sulfide photoconductors have yielded a better understanding of the mechanism of photoconductivity involved. Two problems were of particular concern: (a) the validity of the assumptions of the majority carrier model of photoconductivity, and (b) the role of the electronic traps probed by field effect in the photoconductive process.

PB 157 194 $13.50

Utah U., Salt Lake City.
STUDIES IN DIFFRACTION. PART A. WIDE ANGLE DIFFRACTION OF HALF PLANE. PART B. DIFFRACTION PATTERNS OF SLITS OF VARYING WIDTHS, by Michael S. Tavenner. Master's thesis. Research rept. on Contract AF 49(638)799. Dec 60, 200p. 24 refs. AFOSR-TN-60-1487; AD-249 245.

DESCRIPTORS: *Diffraction, *Diffraction gratings, Photometers, Measurement, Tables, Polarization.

Contents:
Wide angle diffraction for a half plane
Introduction
Apparatus
General description
Reflections
Edges
Light source

Alignment of photometer
Electronics
Photomultiplier
Power supply
Amplifier
Method of measurement
Theory
Results and conclusions
Diffraction patterns of slits of varying widths
Method of measurement
Introduction
Equipment
Results

Solid State Physics

ANL-6463 $1.75

Argonne National Lab., Ill.
EFFECTS OF SPIN-ORBIT COUPLING IN Si AND Ge, by L. Liu. Rept. on Contract W-31-109-eng-38. Nov 61, 72p.

PB 158 267 $4.60

Bell Telephone Labs., Inc., Whippany, N. J.
SOLID-STATE MASER RESEARCH. Quarterly rept. no. 1, 20 June-20 Sep 60, on Contract DA 36-039-sc-85357. 20 Sep 60, 42p. 5 refs. AD-252 544.

DESCRIPTORS: *Solid state physics, Materials, Microwaves, *Dielectrics, Chromium, Oxides, Titanium compounds, Resonance, Impedance, Measurement, Dielectric amplifiers, Ruby, *Microwave amplifiers, Paramagnetic crystals, Wave transmission, Mathematical analysis, Electric fields, Magnetic fields, Tests, Design, Maser.

The objectives of the work to be carried out on this contract are exploration and research in the field of microwave solid-state masers. During the first quarter research proceeded along two distinct lines, maser materials and maser structures. Two paramagnetic materials were under study, ruby and rutile. In the case of ruby, the purpose of the study was the optimization of chromium concentration for maser operation over a wide range of bath temperatures (1.5 to 20 deg K) and at various microwave frequencies. In the case of rutile, a newer and less well known maser material, the objective was the establishment of basic inversion data over a broad range of microwave frequencies leading, in due course, to an evaluation of this material in actual traveling-wave masers. In the field of structures, the dielectrically loaded comb slow wave structure was the subject of a combined analytical and experimental study. This study resulted in an improved understanding of the operation of the comb structure and also in a practical design procedure for predicting the upper and lower cut-off frequencies for loadings covering a wide range of dielectric constants and geometries. (Author)

PB 158 564 $1.60

Brown U. Div. of Applied Mathematics, Providence, R. I.
A NOTE ON UNIQUENESS IN CLASSICAL ELASTODYNAMICS, by M. E. Gurtin and Eli Sternberg. Technical rept. no. 10 on Contract Nonr-562(25). Dec 60, 8p. 10 refs. AD-248 229.

DESCRIPTORS: *Solids, *Elasticity, Mathematical analysis, Stresses, Equations, Differential equations.

The uniqueness theorems of classical elasticity theory are extended for elastodynamics by Neumann (Vorlesungen über die Theorie der Elasticität der festen Körper und des Lichtäthers, B. G. Teubner, Leipzig, 1885). This extension is the dynamic counterpart of the known extension of the uniqueness theorem in elastostatics. The inequalities which are necessary and sufficient for the positive definiteness of the strain-energy density are that the shear modulus is greater than zero and that the Poisson ratio of the material is less than one half and greater than minus one. Proof is given that these inequalities may be relaxed without loss of uniqueness with limitation to the first boundary-value problem of elastodynamics (surface displacements prescribed) and for bounded domains.

PB 158 650 $3.60

Brown U. Div. of Engineering, Providence, R. I.
A THEORY FOR THE OCCURRENCE OF INTRINSIC RESONANCES IN STRESSED SOLID MATERIALS, by S. R. Bodner. Technical rept. no. 21 on Contract Nonr-562(20). Dec 60, 39p. 26 refs. AD-249 427.

DESCRIPTORS: Materials, *Stresses, *Solids, *Resonance, Audiofrequency oscillators, Measurement, Theory, Experimental data.

Experimental work on the measurement of the compliance of initially stressed materials supplied evidence that at least some of the resonances are inherent in the material. A theory is presented to explain these resonances and the low values of the elastic modulus obtained with a Fitzgerald apparatus. The resonances are viewed as self-excited oscillations caused by nonlinear characteristics of the motion of dislocations in the materials. (Author)

PB 157 394 $3.60

Frick Chemical Lab., Princeton U., N. J.
THE MOTION OF THE AMMONIUM ION IN LATTICES OF THE NaCl TYPE, by W. Vedder and D. F. Hornig. Technical rept. no. 7 on Contract Nonr-1858(27). 1 Oct 60, 33p. 80 refs. AD-245 171.

DESCRIPTORS: Crystals, *Ammonium radicals, Ions, Lattices, Crystal structure, *Iodides, Infrared spectroscopy, Spectrographic analysis, Phase transitions, Phase studies, Motion, Rotation, Hyperfine structure.

The infrared spectrum of NH_4I in the NaCl type phase gives insufficient information about the motion of the ammonium ions in that phase. Dilute solutions of NH_4^+ in NaCl type alkali halides provide considerably more detail in the form of a fine structure in most of the absorption bands which becomes visible on sufficient cooling. This fine structure is most certainly correlated with a rotational motion of the NH_4^+ ion. However, both models suggested in the literature - free rotation and rotation of the ion about a N - H ... X^- axis - deviate in many important respects from the experimental results. (Author)

PB 157 535 $9.60

Institute for the Study of Metals, U. of Chicago, Ill.
HIGH PRESSURE RESEARCH. SERIES II. Annual rept. no. 4, Series 2, Oct 59-Oct 60, on Contract Nonr-2121(03). [1960] 120p. 168 refs. AD-250 510.

DESCRIPTORS: *High pressure research, *Crystals, Metallic crystals, Crystal structure, Lattices, Diffusion, Elasticity, Internal friction, Thermodynamics, Chemical bonds, X-ray diffraction analysis, Pressure.

Contents:
Low temperature internal friction in FCC and BCC metals
On the dynamical theory of diffusion in cryatals. III. Some model calculations and relation to continuum theory
The elastic constants of bismuth
A discussion of the 130 kilobar dynamic transition in iron
Diamond cells for X-ray diffraction studies under high pressure
A pseudo-thermodynamic model for the physical behavior of cerium metal
Crystal field splitting and covalent bonding in Fe^{++} silicate garnets
Effect of hydrostatic pressure up to 8000 ATM on the self-diffusion rate of silver single crystals
(See also PB 149 485)

PB 181 089 $0.75

Lockheed Aircraft Corp., Sunnyvale, Calif.
EPITAXIAL GROWTH: AN ANNOTATED BIBLIOGRAPHY, by Helen M. Abbott. Feb 61, 30p. 79 refs. Special Research Bibliography SRB-61-7; AD-253 404.

DESCRIPTORS: *Semiconductors, Transistors, *Single crystals, Growth, Vapor plating, Thin films, Synthesis, Production, Halides, Processing, Bibliography, Crystal structure, Germanium, Metal films, Vaporization, Diodes, Vapors, Crystals.

The bibliography contains selected references pertaining to the epitaxial growth processes, including such factors as crystal growth and formation, vapor growth, twinning and thin film processes. References are arranged alphabetically by author. The following sources were used: Chemical Abstracts: 1947-1959; Science Abstracts (A): 1953-1960; ASTIA-Technical Abstract Bulletin; Electronic Design: 1959-1960: Electronics; 1959-1960; Bell Laboratories Record: 1959-1960; and IBM Journal: 1959-1960. (Author)

PB 158 120 $1.60

Massachusetts Inst. of Tech., Cambridge.
NON-ELASTIC UNLOADING OF COPPER AND ALUMINUM, by A. R. Rosenfield and B. L. Averbach. Technical rept. no. 4 on Contract Nonr-1841(35). 1 Nov 60, 16p. 9 refs. DSR 7618; AD-248 450.

DESCRIPTORS: *Single crystals (Metallurgy), *Copper, *Metallic crystals, *Aluminum, Fatigue (Mechanics), Crystal structure, Low temperature research, Hysteresis, Lattices, Stresses, Crystals, Elasticity.

The mechanical hysteresis curves of copper and aluminum single crystals and polycrystalline samples were measured at 25 and -196 degrees C in the plastic strain range of 0.0001. A departure from elastic unloading is ascribed to the motion of piled-up glide dislocations toward their sources. The stress at which reverse plastic flow starts on unloading is associated with the force required for the glide dislocations to cut through a forest of intersecting dislocations with the formation of a jog. The jog formation energy is calculated to be 1.0 e.v. at 25 C and 1.4 e.v. at -196 C for copper and 0.2 e.v. at 25 C and 0.4 e.v. at -196 C for aluminum. The temperature dependence of the jog formation energy is ascribed to the constriction of stacking faults on the intersection of the partial dislocations. (Author)

UNM-PR-EE-28 $2.60

New Mexico U. Engineering Experiment Station, Albuquerque.
SURFACE STUDIES ON REDUCED TITANIUM DIOXIDE INVOLVING INJECTION REAGENTS AND CONTACT FORMING, by Richard Bechtel, Goebel Davis Jr. and others. May 61, 23p.

PB 158 052 $2.60

New York State Coll. of Ceramics, Alfred U.
SEMICONDUCTING MATERIALS, by Thomas J. Gray. Semi-annual rept. on Contract Nonr-1503(01). 1960, 29p. 5 refs. AD-244 415.

DESCRIPTORS: *Semiconductors, Thermoelectricity, Photoconductivity, Selenides, Tellurides, Bismuth compounds, Boron compounds, Phosphides, Cadmium compounds, Crystals, Electrical properties, Refrigeration systems, Cooling.

An investigation was continued of the II-VI- and III-VI-type semiconductor compounds. Effort was directed toward (1) finding a theoretical solution to high-current pulsing of semiconductor thermoelements, (2) determining experimentally the difference in semiconductor properties when equilibrium (dc) measurements are replaced by non-equilibrium measurements such as occur with high-current pulses and across large thermal gradients, and (3) investigating the changes in the properties of so-called perfect crystals as surface effects (polycrystallinity) are added. In the thermoelement studies, attempts to calculate the temperature overshoot found in the response of a system to high-current pulsing resulted in discrepancies which were thought to be mathematical in origin. A new

sample holder for four-point resistivity measurements led to advancements in the development of a high-intensity pulse-power supply for thermoelectric cooling tests. To facilitate the measurement of ac Hall effect on polycrystalline samples, a high-intensity flash unit was attached to the photoconductivity test rig for producing thermal glo-curves. A high density hot-pressed sample of boron phosphide exhibited promising thermoelectric properties. (See also PB 150 537)

PB 158 579 $11.50

Princeton U., N. J.
ROTATIONAL STATES OF A RIGID TETRAHEDRON IN A CUBIC CRYSTAL, by Harry F. King. Technical rept. no. 8 on Contract Nonr-1858(27). 1 Dec 60, 154p. 59 refs. AD-249 376.

DESCRIPTORS: *Crystals, *Alkali metal compounds, Halides, Single crystals, Crystal structure, *Infrared spectroscopy, Absorption, Ions, Lattices, *Electrostatics.

Contents:
The rigid rotor
  The Hamiltonian
  Expansion in angular momentum functions
  Transformation properties
  Symmetry-adapted basis functions
  The Hamiltonian matrix in the symmetry-adapted basis
Computer programs
  Symmetry-adapted function
  Matrix elements
  Roots and vectors and other matrix routines
The potential function
  The effective single-particle potential
  A point charge model
  Multiple minima of the potential function
  Energy levels and wave functions
The not-so-rigid rotor
  Symmetry operations
  The Hamiltonian

PB 157 782 $3.60

Purdue Research Foundation, Lafayette, Ind.
SEMICONDUCTOR RESEARCH. Quarterly rept. no. 1 1 Oct-31 Dec 60, on Contract DA 36-039-sc-87394. [1960] 36p. 18 refs. PRF 2641; AD-254 072.

DESCRIPTORS: *Semiconductors, Absorption, Electrical properties, Radiation damage, Optics, Low temperature research, Materials, Intermetallic compounds, Transport properties, Specific heat, Magnetic susceptibility, Magnetic properties, Paramagnetic resonance, Infrared radiation.

Electrical and Optical Properties - Galvanomagnetic Effects in n-GaSb, Hot carrier Ionization of Ga and Cu impurities in germanium, IR measurements of hot carrier temperature in p-type Ge, Microwave conductivity of semiconductors, Recombination radiation in GaSb, and IR absorption in GaSb; Irradiation Effects - Optical behavior of irradiated Si, and Paramagnetic resonance in neutron-irradiated Si; Low Temperature Studies - Specific Heat of Si-doped Ge, Transport properties of Ge at low temperatures, Magnetic susceptibility, and Improvements in the adiabatic demagnetization cryostat; General - IR absorption in p-type Ge, and Material preparation.

PB 157 298 $1.60

Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.
RESEARCH ON PARAMAGNETIC RESONANCES, by R. L. Kyhl and M. W. P. Strandberg. Final rept. on Contract DA 36-039-sc-74895. 15 Aug 60, 18p. 9 refs. AD-252 574.

DESCRIPTORS: *Paramagnetic resonance, X-band, *Microwave amplifiers, Paramagnetic crystals, Phonons, Chromium, Sapphires, Lattices, Magnetic fields, Microwaves, Absorption, Production, Broadband, Tests, Ruby, Masers.

Measurements of the orientation dependence of the linewidth of the paramagnetic resonance in ruby are presented. Preliminary results with an X-band ultrasonic generator are described. The present status of work directed toward realizing a reactance-compensated paramagnetic amplifier is indicated. (Author) (See also PB 155 029)

PB 158 054 $8.10

Utah U., Salt Lake City.
INTERNAL FRICTION IN ALUMINUM OXIDE SINGLE CRYSTALS, by R. J. Huber, G. S. Baker, and P. Gibbs. Technical rept. no. 14 on Contract Nonr-1288(03). 1 Nov 60, 85p. 44 refs. AD-248 935.

DESCRIPTORS: *Single crystals, *Sapphires, *Internal friction, *Corundum, Measurement, Crystal structure, Aluminum compounds, Deformation, Oxides

Internal friction measurements were made on A1203 single crystals in longitudinal oscillation at a frequency of 50 kc and at strain amplitudes up to 10 to the -5th power, by the composite oscillator technique as a function of temperature between 25 and 1850 degrees C, and as a function of plastic deformation of the samples. Dislocation densities range from about 5 x 10 to the 6th power dislocations sq cm. in the undeformed crystals to near 5 x 10 to the 7th power dislocations sq cm. in the heavily deformed samples. Undeformed crystals showed no observable change in internal friction below 1800 degrees C. Samples deformed near 1300 C showed a thermally activated change in internal friction which was observable above a background logarithmic decrement of 4 x 10 to the -5th power at temperatures greater than 1450 C. The logarithmic decrement at the maximum temperature of 1850 was 4 x 10 the -3rd power. Activation energies ranged between 80 and 140 kilocalories/mole. A few minutes exposure of these samples to temperatures above 1900 C resulted in a decrease of a factor of 5 in the internal friction vs. temperature curve. Crystals deformed in tension in an oxygen-natural gas flame near 1900 C showed a similar form, but smaller increase in internal friction than the samples deformed at the lower temperature. No amplitude dependence was observed at strains of 10 to the -5th power or less. (Author)

PB 156 562 $10.10

X-Ray and Crystal Analysis Lab., Pennsylvania State U., University Park.
CRYSTAL STRUCTURE RESEARCH BY X-RAY AND NEUTRON DIFFRACTION, by Ray Pepinsky. Quarterly progress rept. no. 10, 1 Sep-31 Nov 56, on Contract DA 36-039-sc-63233. [1956] 130p. 70 refs. AD-153 826.

DESCRIPTORS: *Crystal structure, *X-ray diffraction analysis, *Neutron diffraction analysis, *Antiferroelectricity, *Lead, *Barium compounds, *Titanates, Crystals, Measurement, Conductivity, *Fluoberyllates, *Ammonium radicals, *Ferroelectric materials, Electric fields, Transition temperatures, Phase studies, *Glycines, Iron compounds, *Ferroelectricity, Transition elements, *Piezoelectric crystals.

A full account is given of the neutron diffraction analysis of orthorhombic barium titanate (temperature range -5 to -80°C). The structure of antiferroelectric lead zirconate, $PbZrO_3$, has been determined by a joint x-ray and neutron analysis. Although x-ray examination has suggested that the low-temperature phase of barium titanate (below -80°C) is rhombohedral, new optical and dielectric measurements suggests that the true symmetry is probably monoclinic. A new ferroelectric has been discovered and is reported which contains no oxygen. This is ammonium fluoberyllate, $(NH_4)_2BeF_4$. (Author)

PB 156 563 $6.60

X-Ray and Crystal Analysis Lab., Pennsylvania State U., University Park.
CRYSTAL STRUCTURE RESEARCH BY X-RAY AND NEUTRON DIFFRACTION, by Ray Pepinsky. Quarterly progress rept. no. 11, 1 Dec 56-28 Feb 57, on Contract DA 36-039-sc-63233. [1957] 63p. 40 refs. AD-153 825.

DESCRIPTORS: *Ferroelectricity, *Iron compounds, *Ferroelectric materials, *Fluoberyllates, *Ammonium radicals, *Beryllium, Sulfates, *Selenium, *Sulfur period elements, Crystals, *Crystal structure, *Transistion elements, Transition temperatures, *X-ray diffraction analysis, *Isomeric transitions, *Neutron diffraction analysis, Lattices, Neutron scattering, *Lead compounds, *Titanates, *Barium compounds, *Glycines, Measurement, Conductivity, *Piezoelectric crystals

Following Matthias' discovery of ferroelectricity in $(NH_4)_2SO_4$, we found that the purportedly isomorphous $(NH_4)_2BeF_4$ was also ferroelectric. When Matthias found the new and very important ferroelectric $(glycine)_3 \cdot H_2SO_4$ and the isomorphous selenate, it seemed worthwile to attempt the preparation of the cor responding fluoberyllate as well. This attempt was suc cussful, and the salt shows very interesting dielectric behavior. An x-ray structural study of these three salts of glycine is now in progress, and shows the fundamental character of the transition mechanism. Details of the mechanism will not be clear until the three-dimensional x-ray analysis is completed, and a neutron diffraction study of at least two projections is also carried out. The structure of the rhombohedral ferroelectric perovskite-type solid-solution $Pb(Zr_{.75}, Ti_{.25})O_3$ has been determined by a joint x-ray and neutron study, and is also reported here. (Author) (See also PB 156 562)

ANL-6436 $2.00

Argonne National Lab., Ill.
AN ANALYSIS OF SPECIFIC HEAT DATA FOR WATER AND WATER VAPOR IN THE CRITICAL REGION, by E. S. Nowak and R. J. Grosh. Rept. on Contract AT(11-1)-1026. Oct 61, 80p.

TID-13781 $1.10

Engineering Research Labs., Columbia U., New York, N. Y.
BASIC EXPERIMENTAL STUDIES ON BOILING FLUID FLOW AND HEAT TRANSFER AT ELEVATED PRESSURES, by Donald Blackford and Bruce Matzner. Monthly progress rept. Aug 61, on Contract AT(30-3)-187. 5p.

NYO-9648 $3.60

Engineering Research Labs., Columbia U., New York
BASIC STUDIES IN HEAT TRANSFER AND FLUID FLOW. Quarterly progress rept. 1 July-30 Sep 61, on Contract AT(30-3)-187. Nov 61, 37p.

GEAP-3703 $2.25

General Electric Co., San Jose, Calif.
HEAT TRANSFER COEFFICIENTS WITH ANNULAR FLOW DURING "ONE-THROUGH" BOILING OF WATER TO 100 PER CENT QUALITY AT 800, 1100, AND 1400 PSI, by E. E. Polomik, S. Levy and S. G. Sawochka. Rept. on Contract AT(04-3)-189. May 61, 103p.

PB 159 159 $15.50

Minnesota U. Engineering Experiment Station, Minneapolis.
LABORATORY RESEARCH FOR THE DETERMINATION OF THE THERMAL PROPERTIES OF SOILS, by Miles S. Kersten. Final rept. June 49, 235p. 19 refs. Technical rept. no. 23.

DESCRIPTORS: *Soils, Scientific research, Thermal diffusion, Heat, *Heat transfer, Tests, Insulating materials, Measurement, Specific heat, Moisture, Bituminous surfacing, Thermal diffusion, Thermal expansion, Thermal insulation, Density, Diffusion, Temperature perception, *Thermodynamics

Thermal conductivity tests have been conducted on 19 soils at a number of different density and moisture content conditions. The tests have shown that the coefficient of thermal conductivity varies. The specific heats of a variety of soils are all approximately the same. The values decrease with a decrease in temperature. The specific heat of soil-water mixtures may be calculated by proportion according to the percentages of weight of soil and water and the respective specific heats. The thermal conductivity of

light-weight concrete slabs varies with the density. On the basis of the thermal conductivity tests, four charts are presented to aid in the prediction of conductivity values for any other soil. Separate charts are given for sands or sandy soils and for silt or clay soils; two of the charts are for frozen material and two for unfrozen. The diffusivity of a soil may be computed if its coefficient of thermal conductivity, specific heat and density are known. Thus, the determinations of this research also serve as a basis for estimating diffusivity.

OTS SB-450 $0.10

Office of Technical Services, Dept. of Commerce, Washington, D. C.
HEAT TRANSFER AND HEAT EXCHANGERS. Feb 61, 33p. 591 refs. OTS Selective Bibliography SB-450

DESCRIPTORS: *Heat transfer, *Heat exchangers, *Bibliography, Thermodynamics.

Lists 591 PB reports, AEC reports and translations added to the OTS collection during 1950 to January 1961. Reports cover heat transfer theory, mathematical analysis, measurements, and measuring equipment; heat transfer effects in metals, ceramics, gases, liquids, blunt bodies; liquid metals as heat transfer media. Separately listed are reports on heat exchangers.

AD-259 927 $7.60

Polytechnic Inst. of Brooklyn, N Y.
ON THE INTERIOR OF NORMAL SHOCKS ACCORDING TO CONTINUUM THEORY, INCLUDING RATE THERMOCHEMISTRY, by George Gaitatzes and Martin H. Bloom. Interim rept. on Research on Aerodynamic Flow Fields, Contract AF 33(616)7661. June 61, 73p. 28 refs. PIBAL rept. no. 548; ARL-65.

DESCRIPTORS: *Thermochemistry, Thermodynamics, *Shock waves, Heat transfer, *Reaction kinetics, Kinetic theory, Relaxation time, Dissociation, Recombination reactions, Gas flow.

Continuous profiles of thermodynamic variables, composition, and velocity through a one-dimensional shock model are calculated numerically by continuum theory in nitrogen-oxygen mixtures, including effects of rate-dissociation processes. A number of simplifying assumptions are utilized in the analysis, with the primary effect that it is not required to consider the explicit effects of mass diffusion processes. Specifically, a characteristic Lewis number of unity is assumed in the energy equation to permit the approximate inclusion of diffusion on the heat flux, while diffusion is explicitly neglected in the species conservation relation. A characteristic Prandtl number of 3/4 is assumed to permit the complete integration of the energy equation, and the satisfaction of the Rankine-Hugoniot conditions of uniformity at plus and minus infinity. Viscosity and thermal conductivity are taken into account. Classical chemical kinetics are employed. Vibrational equilibrium is assumed. Upstream velocities between 10,000 and 35,000 fps at altitudes of 100,000 to 200,000 feet are considered.

PB 159 136 $2.60

Stanford Research Inst., Menlo Park, Calif.
CALCULATION OF THERMAL CONDUCTIVITIES, by Rudolph J. Marcus. Final rept. on Contract Nonr-2766(00). 25 Jan 61, 22p. 7 refs. SRI Proj. no. SU-2753; AD-252 262.

DESCRIPTORS: *Liquids, *Vaporization, Temperature, Density, *Hydrocarbons, Mathematical analysis, *Heat transfer, Energy, Viscosity.

A method was developed for calculating the energy of vaporization of a liquid which requires only knowledge of the boiling point and the density at that temperature. The energies of vaporization of the liquid hydrocarbons from methane to isobutane were calculated and compared with experimental values. The viscosities of a number of liquids were calculated, using energies of vaporization estimated from boiling point and density, and were compared with experimental values. The viscosities of a number of fused salts were calculated in the same manner and compared with experimental values. The results showed that this method of estimating viscosities gives good results even at quite high temperatures. A method has been developed for calculating the temperature dependence of the thermal conductivity of liquids. For this calculation only the boiling point and the density of the liquid are required to be known. The comparison of calculated and experimental data shows an average deviation of 4.6% for twenty liquids. (Author)

K-1494 $1.75

Union Carbide Nuclear Co., Oak Ridge, Tenn.
TOSS: AN IBM-7090 CODE FOR COMPUTING TRANSIENT OR STEADY STATE TEMPERATURE DISTRIBUTIONS, by David Bagwell. Rept. on Contract W-7405-eng-26. Dec 61, 77p.

Wave Propagation

PB 158 715 $2.60

Airborne Instruments Lab., Deer Park, N. Y.
TIME-FREQUENCY VARIATION OF TROPOSPHERIC SCATTER PROPAGATION, by J. C. Greene. Final rept. on Contract DA 36-039-sc-73276. Aug 60, 21p. Rept. no. 4231-2; AD-244 134.

DESCRIPTORS: *Radio communication systems, *Radio waves, Propagation, Scattering, Atmosphere, Data, Analysis, S-band, Communication systems.

Experimental data have been collected during a 6-month period on an experimental swept-frequency tropospheric scatter link operated at S-band. The transmitted frequency was swept over a 180-Mc band at a 10-cps rate, and the received signal level recorded as a simultaneous function of frequency and time. Under average weather conditions and using narrow-beam antennas, the frequency-time characteristics of signals exceeding a particular threshold level are a function of the particular threshold level chosen,

but that the frequency characteristic is always approximately related to the time characteristic. The effective system bandwidth necessary for no correlation with adjacent bandwidths is only slightly less than the value determined from the differential path delay computed on a simplified two-ray basis (about 13 Mc for this link). Depending on the spectrum of the signal being transmitted, considerable improvements in scatter-link operation can be obtained by periodically searching for an optimum transmission frequency. This improvement can be determined on a statistical basis when the allowable search bandwidth is specified. (Author) (See also PB 149 022)

PB 157 833 $4.60

American Optical Co., Southbridge, Mass.
CYLINDRICAL DIELECTRIC WAVEGUIDE MODES, by Elias Snitzer. Scientific rept. no. 1 on Contract AF 19(604)7207. Apr 61, 43p. 12 refs. AFCRL-196.

DESCRIPTORS: *Waveguides, *Dielectrics, *Cylindrical bodies, *Electromagnetic waves, Propagation, Mathematical analysis, Bessel functions, Special functions, Magnetic fields

The propagation of cylindrical dielectric waveguide modes near cut-off and far from cut-off is considered. The relative amounts of E_z and H_z, and the transverse components of the field are determined for both sets of hybrid modes. With the radial dependence of the z-components of the field in the central dielectric given by J_n (ur/a), the transverse components far from cut-off are given by $J_{n \pm 1}$ (ur/a), where u is a parameter found from the boundary conditions and which fixes the scale of the Bessel function relative to the boundary r=a. The two values n+1 and n-1 correspond to the two sets of modes. The designation of the hybrid modes are discussed. Field plots for the lower order modes are given. (Author)

PB 157 834 $4.60

American Optical Co., Southbridge, Mass.
OBSERVED DIELECTRIC WAVEGUIDE MODES IN THE VISIBLE SPECTRUM, by Elias Snitzer and Harold Osterberg. Scientific rept. no. 2 on Contract AF 19(604)7208. Apr 61, 43p. 8 refs. AFCRL-197.

DESCRIPTORS: *Waveguides, *Dielectrics, *Cylindrical bodies, *Electromagnetic waves, Propagation, *Dielectric materials, Refractive index, Monochromatic light, Glass textiles, Optics, Spectrographic analysis

The direct images and the radiation patterns of the first few lowest order dielectric waveguide modes were observed in the visible region of the spectrum for fibers with core and cladding indices of refraction of 1.56 and 1.52, respectively, and for core diameters from 0.1 to 5.5 microns. The cut-off wavelengths for the observed modes are in reasonably good agreement with theory. Photographs of the modes are shown. (Author) (See also PB 157 833)

PB 157 527 $7.60

Bolt Beranek and Newman, Inc., Cambridge, Mass.
WAVE PROPAGATION ON BEAM PLATE SYSTEMS, by Manfred Heckl. Rept. on Contract Nonr-2322(00). 28 Sep 60, 78p. 14 refs. Rept. no. 773; AD-245 026.

DESCRIPTORS: *Beams, *Deformation, Wave analysis, Attenuation, Damping, Metal plates.

Formulas for the attenuation of bending waves that travel over a beam plate system, containing one or several beams, are derived and compared with measurements. One beam gives an attenuation which is very small near the resonances of the beam and rather high elsewhere, but in the average over wide frequency bands the attenuation appears to go nearly like the square root of frequency. The addition of beams of the same material and dimensions does not give an appreciable increase in attenuation. Formulas for the force impedance and mean square velocity of beam plate systems are also given. Finally, the damping of a beam by a plate attached to it and the damping of a plate by a beam attached to it is discussed. (Author)

PB 156 224 $1.10

Electrical Engineering Research Lab., U. of Illinois, Urbana.
IONOSPHERIC RESEARCH AND PROPAGATION STUDIES, by R. A. Davidson. Quarterly progress rept. no. 1, 1 July-30 Sep 60, on Contract DA 36-039-sc-85173. [1960] 8p. AD-252 026.

DESCRIPTORS: *Ionospheric propagation, *Radio astronomy, *Radio signals, Radar reflections, Radar echo areas, Scientific research, Propagation, Reflection.

An investigation was conducted to obtain data from lunar radio echoes to determine the ionospheric electron content and its fluctuations. Other tests will be run to determine the nature and causes of fading of reflected signals and the brightness distribution of radio signals reflected from the moon. The majority of the tests will be conducted with a 28-foot Kennedy antenna. Because the present location of the antenna is not suitable for the tests to be made because of local radio interference the antenna is to be relocated on the University of Illinois Radio Astronomy site. The Radio Astronomy site consists of approximately 200 acres of land about 5 miles south-east of Danville, Illinois. The site is quiet (from a radio-noise standpoint) and is suitable for location of both the Radio-Telescope presently on the site and the 28 foot Kennedy parabola. Progress in moving the antenna to its new site is reported. (Author)

PB 156 225 $1.10

Electrical Engineering Research Lab., U. of Illinois, Urbana.
IONOSPHERIC RESEARCH AND PROPAGATION STUDIES, by R. A. Davidson. Quarterly progress rept. no. 2, 1 Oct-31 Dec 60, on Contract DA 36-039-sc-85173. [1961] 4p. AD-252 027.

DESCRIPTORS: *Ionospheric propagation, *Radio astronomy, *Radio signals, Radar echo areas, Scientific research, Radar reflections, Propagation, Reflection.

Plans for the installation were completed. The antenna and its associated electrical controls were disassembled and transported to the new location. Parts which can be damaged by weathering are temporarily stored in the Radio Telescope instrument building on the site where facilities are available for trouble-shooting the electronic gear. Other parts, including the major parts of the antenna were inspected and partially reassembled. (Author) (See also PB 156 224)

PB 154 998 $2.60

Electronic Defense Labs., Mountain View, Calif.
DIFFRACTION BY A THICK SCREEN, A STEP, AND RELATED AXIALLY SYMMETRIC OBJECTS, by J. E. Burke and J. B. Keller. Rept. on Contract DA 36-039-sc-78281. 1 Mar 60, 29p. 6 refs. EDL-E48; AD-239 717.

DESCRIPTORS: Electromagnetic waves, *Electromagnetic fields, Electromagnetic wave reflections, Scattering, *Diffraction, Geometry, Theory, Bodies of revolution, Conical bodies, Surfaces

The geometrical theory of diffraction is applied to diffraction by a thick screen with a flat end, which may be either a truncated cone or a thick "half-plane". This result is then used to determine the field diffracted by a wave incident upon a surface containing a step. By a slight modification of the analysis, diffraction by a semi-infinite circular cylinder with a flat end and by a truncated circular cone are also treated. Similarly, the field diffracted at the junction between two parallel circular cylinders and at that between a truncated cone and a cylinder are dealt with. In these latter cases the incident field is assumed to be a plane wave incident along the axis. To solve some of these problems a new diffraction coefficient is determined. A method for dealing with grazing incidence is also presented. Both the new coefficient and the new method are applicable to many other problems. (Author) (See also PB 154 999, PB 155 548)

PB 154 999 $2.60

Electronic Defense Labs., Mountain View, Calif.
DIFFRACTION BY FINITE BODIES OF REVOLUTION, by J. E. Burke and J. B. Keller. Rept. on Contract DA 36-039-sc-78281. 4 Apr 60, 28p. 6 refs. EDL-E49; AD-239 718.

DESCRIPTORS: Bodies of revolution, *Electromagnetic fields, Electromagnetic waves, High frequency, Electromagnetic wave reflections, Scattering, *Diffraction, Geometry, Theory, Cylindrical bodies.

The fields scattered by a variety of finite bodies of revolution are constructed by using the geometrical theory of diffraction. This theory specifies the scattered field as a superposition of fields on various rays. Some of these are specularly reflected from portions of the body having radii of curvature large compared to wavelength (the usual optical rays), and the remaining are diffracted rays. Treated first is the multiple diffraction of an axially incident plane wave by curved edges of "hard" and "soft" finite cones (i.e., for boundary conditions that the normal derivative of the field, or the field itself, vanishes at the surface). By modifying the analysis and results slightly, the corresponding fields for a finite circular cylinder, a cone backed by a finite circular cylinder, a circular cylinder with a spherical nose, etc. are found. The fields on edge diffracted rays for non-axial incidence, and on tip diffracted rays, are also considered. The extension of such scalar results to vector electromagnetic problems is illustrated by considering diffraction by a circular edge of a perfect conductor. (Author) (See also PB 155 598)

RESEARCH METHODS, TECHNIQUES AND EQUIPMENT

PB 158 667 $1.60

Columbia U., New York.
ON THE PROBABILITY LAW OF THE BUSY PERIOD FOR TWO TYPES OF QUEUING PROCESSES, by Lajos Takács. Rept. on Contract Nonr-266(59). 9 Dec 60, 12p. 1 ref. CU-22-61-Nonr-266(59)MS: AD-249 546.

DESCRIPTORS: *Operations research, Probability.

A simple combinatorial method is given for the determination of the joint distribution of the length of the busy period and the number of customers served during this period for two types of single-server queuing processes: (1) Customers arrive at a counter according to a Poisson process and the service times have a general distribution; and (2) Customers arrive at a counter according to a recurrent process and the service times have an exponential distribution.(Author)

PB 155 056 $1.60

Feltman Research Labs., Picatinny Arsenal, Dover, N. J.
DIMENSIONAL STUDY OF VIBRATING REED SPECIMENS, by Andrew R. Blanck and Benjamin T. Holman. Jan 61, 13p. 7 refs. Technical notes no. FRL-TN-39; AD-250 778.

DESCRIPTORS: Vibration, *Vibration mechanisms, Elasticity, Mechanical properties, Tests, Test equipment, Test methods, Polymers, *Plastics.

The dimensions and tolerances of specimens used in the vibrating reed test were investigated. Thicknesses of 0.020 to 0.150 inch, widths of 0.125 to 0.750 inch, and tapers of 0.000 to 0.015 inch were studied. The following dimensions and tolerances are recommended for future use as providing the most reliable data and calling for the simplest specimen fabrication: (1) thickness of 0.100 + or - 0.005 inch, with a 0.002 max taper; (2) width, preferred of 0.5 + or - 0.025 inch, with 0.005 max taper; and (3) width, acceptable of 0.178 + or - 0.005 inch, with 0.003 max taper. (Author)

PB 155 328 $4.60

Kleinschmidt Labs., Inc., Deerfield, Ill.
TELETYPEWRITER SET AN/MGC-18 ( ), by Alvin Y. Brust. Final engineering rept. 1 July 58-29 Feb 60, on Tactical Teletypewriter Equipment, Development, Construction, and Evaluation, Contract DA 36-039-sc-66480. [1960] 50p. AD-249 836.

DESCRIPTORS: *Teletype systems, Mobile, *Communication systems, *Teletype equipment, Tests, Design, Military requirements.

Progress is described on the development of the Teletypewriter Set AN/MGC-18. The preliminary bounce test of the Page Printer, in accordance with specification SCL - 1847, showed that there were certain areas which would require basic redesign. However, the same test performed on the Reperforator - Transmitter indicated that the basic unit would pass the bounce requirement. The method of spacing and the means by which the platen shifts was redesigned which enabled the printer to successfully pass the bounce requirement. The dust covers of both units were redesigned to meet the sand and dust requirement; also, the keyboard, excepting the keytops, has been placed in a dust proofed enclosure. (Author)

SOCIAL SCIENCES

PB 158 184 $12.00

Air Force, Washington, D. C.
JUDGE ADVOCATE GENERAL ACTIVITIES. FISCAL LAW. 1 July 61, 168p. 87 refs. AFM 110-4

DESCRIPTORS: *Federal budgets, *Military budgets, Air force, Instruction manuals.

This manual is published primarily for the information and guidance of all judges advocates and is also designed to aid other Air Force civilian and military personnel engaged in the various phases of Air Force fiscal matters. It covers the principal references to decisions and opinions concerning the significant substantive and procedural laws and regulations involved in the solution of accounting and finance questions. The various subject matter areas are cross-referenced to applicable Air Force accounting and finance regulations.

PB 158 651 $3.60

Wisconsin U., Madison.
HIGH LATITUDE FRINGES OF SETTLEMENT, by Kirk H. Stone. Annual rept. on Contract Nonr-1202(05). 1 Dec 60, 36p. 7 refs. AD-246 656.

Color maps will not reproduce.

DESCRIPTORS: *Population, *Finland, *Sweden, *Canada, *Rural areas, Iceland, Norway, Alaska, *Geography, *Bibliography, Arctic regions

This project focuses upon the transfer of settlement experience between roughly similar regions. The principal objective is to determine what settlement experience in Norden (countries of older settlement) may be used in planning for present and additional settlement in northern North America (countries of newer settlement). These data may be obtained by the location, classification, and determination of the characteristics of the fringe of settlement regions in Iceland, Norway, Sweden, Finland, northern Canada, and Alaska. Especial attention is given to the measurement of the degree of permanence of settlement in these areas. The secondary objectives are to train geographical graduate students in research on the fringes of settlement and to strengthen relations between geographers in Scandinavia and North America.

MISCELLANEOUS

PB 181 068 $1.25, $10.00/year

Naval Research Lab., Washington, D. C.
REPORT OF NRL PROGRESS. Jan 62.

DESCRIPTORS: Liquid metals, Paints, Fuel tanks, Fuels, Storage, Chemistry, Wood, Tropical deterioration, Monomolecular films, Surface temperatures, Convection, Lead compounds, Dioxides, Microstructure, Metal plates, Chlorates, Sulfates, Carbon dioxide, Oxygen, Mustard gas, Evaporation, Mechanics, Pressure vessels, Failure (Mechanics), Glass textiles, Rocket motor cases, Ultrasonic radiation, Nondescructive testing, Rocket motor nozzles, Tungsten, Thermal stresses, Metallurgy, Ceramic materials, Steel, Nickel, Creep, Rupture, Hardening, Reactor inspection, Corrosion, Oceans, Wires, Radio, Waveguides, Polarization, X-band, Targets, Hydraulic systems

Contents:
Articles:
Physico-Chemical Properties of Liquid Metals and Dilute Liquid-Metal Solutions, by S. W. Strauss
Leak-Indicating Paints for Rocket-Fuel Tanks and Storage Areas, by J. R. Griffith
Scientific program:
Chemistry: Natural resistance of woods to biological deterioration in tropical environments--screening tests of a large number of wood species. Effect of monomolecular films on surface temperature and convective motion at the water-air interface. Investigation of the microstructure of lead dioxide and sponge lead plates as influenced by different temperatures, electrolytic specific gravities, and current densities in the forming process. Chlorate candle fabrication by hot pressing. Laboratory scale operation of a sulfate cycle for carbon dioxide removal and oxygen generation. Studies of the evaporation of mustard gas from paint films
Mechanics: Prediction of failure due to mechanical damage in the outer hoop windings of fiberglass plastic pressure vessels. Automatic ultrasonic inspection techniques for the detection of flaws in steel rocket motor cases. Tungsten rocket-nozzle throat inserts inspected ultrasonically. Thermal stress transients in a 1-in. thick tungsten slab
Metallurgy and Ceramics: Fractography of AMS 6434 sheet steel. Role of impurities in the creep-rupture behavior of two grades of nickel in nitrogen and in vacuum. Dynamic effects arising from high-speed solidification. Effects of nuclear radiation on the

properties of reactor structural materials. Corrosion of structural materials in great depths in the ocean and a new cathodic protection system for large wire-rope structures (such as deep-sea moorings)
Radio: Special circular waveguide devices for polarization research at X-band and a microwave dark-room facility for studying the polarization transformation properties of simple model targets. Some aspects of go, no-go testing of randomness of continually generated binary digits
Supporting Techniques: Remotely Operated Hydraulic Shear for Hot Cell Applications

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U. S. DEPARTMENT OF COMMERCE FIELD OFFICES

SERVE THE BUSINESS COMMUNITY

The Department of Commerce maintains Field Offices to enable the business community to avail itself locally of Government facilities designed to promote commerce. Working closely with various units in the Department and, when necessary, with other Government agencies, the Field Offices provide business services to manufacturers, wholesalers, retailers, trade publications, trade associations, advertising agencies, research groups, financial institutions, and exporters and importers.

Experienced personnel will gladly assist in the solution of specific problems, explain the scope and meaning of regulations administered by the Department, and provide practical assistance in the broad field of domestic and foreign commerce. Field offices act as official sales agents of the Superintendent of Documents, and maintain an extensive business reference library containing periodicals, directories, publications and reports from official as well as private sources.

Among the many services which businessmen have found of value are:

GENERAL

- Management and business aids
- Establishing a new business

BASIC ECONOMIC DATA

- Census data, with national and often State and regional breakdowns, on manufacturing, wholesaling, retailing, service industries, employment and unemployment, population, housing, agriculture
- Basic records of national income and product, regional trends, balance of payments, foreign aid

MARKETING AND DISTRIBUTION

- Development and maintenance of markets
- Distribution channels, facilities and services
- Marketing and distribution statistics

PRODUCTION

- Modernization of plant processes and other technological aids
- Development of new products
- Government-owned patents for free license
- Commodity standards

FOREIGN TRADE AND INVESTMENT

- Tariff and exchange regulations
- Import and export quotas, licensing regulations
- Statistics on imports and exports
- Investment and trade opportunities abroad
- Economic conditions in foreign countries

COOPERATIVE OFFICES

To make the services of the Department of Commerce more widely available, agreements have been entered into with more than 750 Chambers of Commerce, Manufacturers Associations, and similar business groups under which these organizations have become official Cooperative Offices of the Department. If specific information is not on hand in the Cooperative Office, your problem will be referred to the nearest Departmental field office.

Department Field Offices

ALBUQUERQUE, N. MEX., U.S. Courthouse.
ATLANTA 3, GA., 604 Volunteer Bldg.
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BUFFALO 3, N.Y., 504 Federal Bldg.
CHARLESTON 4, S.C., Area 2, Sergeant Jasper Bldg., West End Broad St.
CHEYENNE, WYO., 207 Majestic Bldg.
CHICAGO 6, ILL., Room 1302, 226 W. Jackson Blvd.
CINCINNATI 2, OHIO, 809 Fifth Third Bank Bldg.
CLEVELAND 1, OHIO, Federal Reserve Bank Bldg.
DALLAS 1, TEX., Room 3–104 Merchandise Mart.
DENVER 2, COLO., 142 New Customhouse.
DETROIT 26, MICH., 438 Federal Bldg.
GREENSBORO, N.C., 407 U.S. Post Office Bldg.
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HOUSTON 2, TEX., 610 Scanlan Bldg.
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MEMPHIS 3, TENN., 212 Falls Bldg.
MIAMI 32, FLA., 408 Ainsley Bldg.
MINNEAPOLIS 1, MINN., 304 Federal Bldg.
NEW ORLEANS 12, LA., 333 St. Charles Ave.
NEW YORK 1, N.Y., Empire State Bldg.
PHILADELPHIA 7, PA., Jefferson Bldg.
PHOENIX, ARIZ., 137 N. Second Ave.
PITTSBURGH 22, PA., 355 Fifth Ave.
PORTLAND 4, OREG., 217 Old U.S. Courthouse and P.O. Bldg.
RENO, NEV., 1479 Wells Ave.
RICHMOND 19, VA., 309 Parcel Post Bldg.
ST. LOUIS 3, MO., 2511 Federal Bldg.
SALT LAKE CITY 1, UTAH, 222 SW. Temple St.
SAN FRANCISCO 11, CALIF., Room 419 Customhouse.
SAVANNAH, GA., 235 U.S. Courthouse and P.O. Bldg.
SEATTLE 4, WASH., 809 Federal Office Bldg.

For local telephone listing, consult section devoted to U.S. Government

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